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DEVELOPMENT OF THE INTEREST-ATTITUDE TESTS

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Some twelve years ago the writers published a series of four tests called the "X-O" examination. Each test covered 125 items toward which the person examined was to express his attitude. From the first list he was to mark those things he thought were wrong; from the second list, those things that were associated in his mind with certain specified concepts (from the Kent-Rosanoff Association Test); from the third list, those things that interested him; and from the fourth list, those things he worried about. A particularly striking characteristic of this test, and of its subsequent revisions, is the remarkable total of items covered (600, 450, 360 points) on a single four-page folder, 9″ x 6″, in about 25 minutes. This series of tests has been widely used both here and abroad.[1] Schemes for analyzing and graphing the results have been developed.[2]

[1] The first report of this work appeared in 1919. (Pressey, S. L. and L. C., "Cross-out Tests—with Suggestions as to a Group Scale of the Emotions," *Journal of Applied Psychology*, 3, pp. 138-150, Sept., 1919), and described also various tests of some interest not included in the later scale. The test as referred to in the text was reported in a later article. Pressey, S. L. and Chambers, O. R., "First Revision of a Group Scale Designed for Investigating the Emotions," *Journal of Applied Psychology*, 4, pp. 97-104, March, 1929. A recently prepared bibliography on the tests contains some thirty titles, and includes reports from Canada, Australia, and Great Britain as well as this country.

[2] Perhaps the best has been devised by Mr. Edwin W. Wright, Personnel Officer of the Chicago Y. M. C. A. Schools.

Certain school officials objected to some terms in the examination, especially for use with younger children. Since the authors particularly desired to trace the development of emotional attitudes from childhood through the adolescent years a second form of the tests was developed. The objectionable and difficult words were replaced and the association test dropped altogether. Form B then consisted of three tests covering possible attitudes on right and wrong, possible worries, and possible interests. In this form the test was given to 1105 boys and 1162 girls from the sixth grade through college. The results were tabulated by item and comparisons made to find out which items were differential of (a) sex, (b) good and poor scholarship, and (c) maturity. It was found possible by selecting the appropriate items to get appreciable correlations with marks or by a different selection to obtain a measure of emotional maturity which seemed of some significance.[3]

I. DEVELOPMENT OF THE INTEREST-ATTITUDE TESTS

The X-O Tests, Form B were somewhat less satisfactory than might be because of (a) poor mechanical arrangement making scoring and analysis difficult, (b) the inclusion of items not shown to be significant by the above mentioned research, (c) remaining difficult vocabulary, and (d) some confusion in the directions. Fur-

[3] Detailed data in mimeographed form, giving per cents marking each word in different groups, differential units, and tentative norms for them may be obtained in mimeographed form from the writers. The research is briefly reported in three articles by Dr. O. R. Chambers, "Character Trait Tests and the Prognosis of College Achievement," *Journal of Abnormal and Social Psychology*, 20, pp. 301-31, 1925; "A Method of Measuring the Emotional Maturity of Children," *Pedagogical Seminary*, Vol. 32, pp. 637-647, 1925; and "Measurement of Personality Traits," in *Research Adventures in University Teaching*, the Public School Publishing Company, 1927, pp. 71-80.

ther, (e) the concept introduced with the X-O Tests, of a multiple-purpose examination from which "differential units" should be analytically scored for special purposes, appeared to be too elaborate for general use (though Strong is now using something of this sort in his vocational interest material). It was therefore decided two years ago[4] to reconstruct these tests completely with reference to the one problem of measuring emotional maturity.

The first step was the selection from the extension X-O data above mentioned of those words which appeared, for both sexes, indicative of maturity; that is, words that were marked distinctly more often by either younger or older children. There were found to be 61 words in the first test (things thought wrong), 51 words in the second (things worried about), and 35 in the third (things interested in) that appeared definitely differential of maturity for both boys and girls. To these words were added others selected as equally differential on the basis of further research. The items of each test were arranged in three columns so as to permit of much easier scoring and analysis. The directions were somewhat condensed, thus leaving the last page free for one additional test (selected after trial of several new tests) in which the pupils were asked to mark those characteristics that they liked in people. The final form, then—called the "Interest-Attitude Tests"—consists of four sub-tests, each containing 90 items listed in three columns; a 9″ x 6″ four-page folder was used. All the material going into this revision has been selected carefully as differentiating children of different age levels.

[4] Under a grant from the Graduate Council of the Ohio State University.

The directions and beginning of the first test are reproduced below:

TEST I

Directions: Below is a list of things which some people think are wrong—that some people think a person ought not to do or is to be blamed for. Place a cross (X) on the dotted line in front of everything YOU think is wrong. Place two crosses (XX) in front of everything which you think is VERY WRONG—that a person is very much to be blamed for. You may mark as many or as few words as you wish. But be sure to mark everything which you think is wrong—that a person is to be blamed for.

1_____accidents
2_____fighting
3_____ignorance
4_____talking back
5_____crying
6_____pride
7_____speeding
8_____reading novels
9_____sadness
10_____atheist
31_____aristocrat
32_____day-dreaming
33_____freak
34_____kidding
35_____poker
36_____screaming
37_____tobacco
38_____bashfulness
39_____disagreement
40_____being conceited
61_____being stubborn
62_____broker
63_____dispute
64_____playing cards
65_____divorce
66_____being clumsy
67_____fear
68_____being dull
69_____punishment
70_____immodesty

The above directions call for both single and double checking of the items, according to the intensity of one's feeling. This technique is especially valuable in the consideration of the separate items. For instance, the word "money" as a thing to be worried about shows almost no checks among the younger children; presently there appears a scattering of single checks during the early years of adolescence; then one finds about an equal number of single and double checks; finally, in the college group, on almost every paper double checks appear. By allowing this expression of the intensity of feeling the test becomes far more sensitive than it could otherwise

be. In handling the results on each item[5] the authors have found the number of check marks per hundred children at the various age levels. This figure is more satisfactory and more flexible than the mere per cent of children marking an item, since per cents could vary only from 0 to 100 whereas the number of marks per hundred children can vary from 0 to 200. The double checking is useful also in the consideration of individual cases because it makes a pupil's more intense attitudes stand out clearly.

It should be mentioned again that some of the words show decreasing numbers of children marking them as one progresses from the lower to the upper years and some show increasing numbers. The method of scoring had, therefore, to take this fact into consideration. The technique finally used was to count up for each test the number of crosses placed before those words showing a decrease with maturity and from this total to subtract the number of crosses before those words showing increases with maturity. Thus if a child marked more "immature" words than "mature" he would receive a positive number for his score; if he marked an excess of "mature" words he would receive a negative number. The total score on the examination is the algebraic sum of the scores on the four tests. The higher the score, then, the younger emotionally is the child. The number of items of each type in the various tests is shown below:

[5] A later paper will present detailed results concerning the separate items of the examination, showing what changes take place for each individual concept with increasing maturity.

TABLE I

Showing Classification of Items

		Positive (immature) Items	Negative (mature) Items
Test I	(Things thought wrong)	80	10
Test II	(Things worried about)	80	10
Test III	(Things interested in)	60	30
Test IV	(Traits admired)	40	50
	Total	260	100

It might perhaps be better to have an equal number of items in each group, but the underlying research failed to reveal more than 100 "mature" items. With the arrangement just presented it would be theoretically possible for scores to vary from 520 points (for a child who double-checked all the "immature" words and none of the "mature") to –200 (for a child who did exactly the reverse). Actually scores have been found to date to vary from +387 to –65, a difference of over 400 points.[6]

It should be noted that the tests seem to measure attitudes rather than vocabulary inasmuch as the number of items checked *decreases* with age rather than showing an increase. The really *mature* person omits altogether the many childish concepts and concentrates heavily on the relatively few adult ideas. Further suggestive evidence is offered by results from a large school where the children are grouped into sections on the basis of intelli-

[6] The "mature" items are mixed with the others in the following arrangement: For Tests I and II the 10 "mature" items are Numbers 10, 20, 30, 40, 50, 60, 70, 80, 89, 90. For Test III, the 30 items are Numbers 11-20 31-40, and 61-70. For Test IV the 50 items are numbers 1-10, 21-30, 41-50, 61-70, and 81-90. It has been found possible (especially on the last test) to form a rough estimate of a child's emotional maturity simply by noting the bunching of his marks with relation to this scheme.

gence tests. The upper half in ability of the seventh grade makes a median score of 75 while the lower half shows a median of 82. Similarly in the eighth grade the highest third in intelligence had a median score of 87, the middle third 64, and the lowest third of 80. Other grades similarly divided showed the same kind of result. And inspection of the items reveals that the words are simple enough to be within the vocabulary of almost all children tested—such words as *accidents, gun, storms, clothes, dying, artist, fishing, prizes, studying, fighting, anger, tobacco, prison, shouting, secrets, generous, brave, patient, innocent, respectable, quiet, etc.*

II. RESULTS OF THE TESTING TO DATE

At the present time these tests have been given to 1,941 boys and 1,934 girls in grades between the fifth and twelfth[7] in twenty different places located in nine states.[8] In spite of the use of terms differential for both sexes, such sex differences in score appear as make necessary separate normative data for each sex. Grade norms for total score based on the above mentioned data run as follows:

TABLE II

Grade Norms: Total Score

	Grades							
	5	6	7	8	9	10	11	12
Girls	161	132	100	69	51	39	27	16
Boys	168	121	96	79	65	54	40	25

[7] Plus scattered results at the college level. Further work will be done in colleges and universities for the obtaining of normative data for the later years of adolescence. The tests have been given also to over 2,000 Indians.

[8] Vermont, Massachusetts, New York, Pennsylvania, Ohio, Oklahoma, Montana, New Mexico, Nebraska.

It will be noted that in some of the earlier grades the boys score as more mature (score lower) than the girls but that from the eighth grade on the girls' medians are all roughly a grade more mature than are the boys. This finding coincides in general with the known fact of the earlier physiological maturity in girls. There is evidence from what college results have been obtained that the boys' medians overtake the girls' and suggests slightly greater maturity by the end of college.

The following table gives medians by grade for each test:

TABLE III

Grade Norms for Each Test

	Grades							
	5	6	7	8	9	10	11	12
Girls								
Test I	49	40	36	32	27	23	20	17
Test II	54	47	33	20	15	12	9	6
Test III	30	25	19	12	8	6	3	1
Test IV	28	20	12	5	1	–2	–5	–8
Boys								
Test I	51	40	36	34	31	29	25	21
Test II	59	40	31	22	16	12	9	6
Test III	36	28	21	19	17	15	11	7
Test IV	22	13	80	4	1	–2	–5	–9

Age norms are also obviously desirable, especially in considering the individual case. The scores on the total examination have, therefore, been considered by age. The writers did not, however, make a tabulation of the scores by age because of the practical impossibility of obtaining unselected age groups,[8] especially from grades as high as the sixth or above. Instead the method used

[8] See Pressey, S. L., "The Problem of the Unselected Group in the Standardization of Tests," *Journal of Applied Psychology*, V:64-71, March, 1921.

(which is believed to give a better approximation to true age norms) was to make an age-grade tabulation for all the cases tested, find the median chronological age per grade, then plot the median score of each grade in relation to the median age of the children making this score. From such a graph one can read off the expected score for each age. It should be noted that (since the testing was done from the sixth to twelfth grades) for ages below 11 and above 18 the curves have had to be prolonged, so as to give a rough indication of the meaning, in terms of age, of unusually high or low scores.

The writers wish at this point to present the concept (previously mentioned by two or three other investigators) of an "emotional age" which might eventually take its place alongside of the mental and achievement ages in the study of the individual. Such a concept would appear to fill a definite need for some way of expressing an individual's emotional development and might conceivably be of great importance in the study of problem children. Thus the brilliant 12-year-old boy with a mental age of 17 and an achievement age of 20+ but an "emotional age" of 9½ sometimes appears as a source of trouble, presumably because such uneven development has led to maladjustment. And certainly more light is shed on the leadership of a 10-year old girl with a mental age of 10½ and an achievement age of 9, if one finds she has an "emotional age" of 15. The same concept could if desired be applied to the separate tests[9] as in the case of one delinquent 15-year-old boy known to the writer whose ideas of right and wrong (Test I) and whose admirations (Test IV) were below the 8 year level, but whose worries (Test II) were characteristically adolescent and whose interests (Test III) were markedly

[9] Anyone interested in this information should write the authors. It seems inadvisable as yet to apply this concept generally to the separate tests until the "emotional ages" of the entire examination have been more completely validated.

adult. Mature interests, the pressure of adolescent worries, plus childish judgment present a characterological outline of presumably distinct significance in understanding the boy's delinquencies. The norms for emotional ages based on total examination scores are presented below with the purpose in mind of getting these tentative standards experimented with.

TABLE IV

Emotional Ages Based on the Total Scores of the Interest-Attitude Tests

Boys				*Girls*			
Score	Emotional Age	Score	Emotional Age	Score	Emotional Age	Score	Emotional Age
300	– 8½	76	–14½	300	– 8	81	–14
285	– 9	64	–15	272	– 8½	63	–14½
252	– 9½	58	–15½	247	– 9	51	–15
213	–10	53	–16	216	– 9½	44	–15½
192	–10½	45	–16½	189	–10	39	–16
155	–11	37	–17	168	–10½	31	–16½
137	–11½	30	–17½	155	–11	24	–17
121	–12	22	–18	143	–11½	19	–17½
112	–12½	17	–18½	132	–12	14	–18
103	–13	10	–19	119	–12½	9	–18½
95	–13½	2	–19½	109	–13	3	–19
86	–14	All Negative scores	–20	97	–13½	All Negative scores	–19½

In using the above norms one simply reads the total score of each child to the *nearest* emotional age. Thus a boy making a score of 241 would be given an emotional age of 9½, since his total is nearer 252 than 213.

III. RELIABILITY AND VALIDITY OF THE TESTS.

The total examination (consisting, it should be remembered, of 360 items) show the remarkably high coefficient

of .99 for 151 girls in the sixth grade,[10] when one-half the examination (first five items in each group of ten in first two columns plus second five in last column) was correlated with the other half. Coefficients for the separate tests were: Test I, .96; Test II, .96; Test III, .91; Test IV, .96.

The validity is, of course, hard to estimate. Various items of evidence are, however, available. First there is the marked variation of median score with chronological maturity; thus between the ages of 11 and 18 the median score for the girls drops from 155 to 15—a difference of 20 points per age. In the second place there is some suggestive evidence from the differences in scores made by pupils in communities of different types. Thus the eleventh and twelfth grade girls in (a) a small town in Montana, (b) a small city in Ohio, and (c) an Eastern boarding school made scores as below.

TABLE V

Showing Comparative Standings of Girls in Three Schools

	Grade 11			Grade 12		
	(a)	(b)	(c)	(a)	(b)	(c)
Median Score	37	29	12	28	14	–2
Median Emotional Age	16	16½	18	16½	18	19½
Median Chronological Age	18.0	17.5	16.5	19.2	18.2	17.2

[10] As a check on this high correlation a second study was made of 97 boys, in the ninth grade, counting merely the number of words marked, instead of the number of marks. The results are naturally lower, but still distinctly high. Total examination –.94; Test I –.90; Test II –.89; Test III –.85; Test IV –.88. These correlations are doubtless in part spurious, being due partly simply to the tendency of some children to use a good many checks and double checks generally while some children tended to mark less. However, on Test IV where the number of positive items is 40 and negative 50, the correlations are still high. Such a set of tests presents special problems as regards the determination of reliability.

The girls in the small town are (Grade 11) 1½ years older chronologically than those in the boarding school, but they test 2 years younger—making the total difference in emotional maturity 3½ between the two groups. Similar comparisons show the small town girls (Grade 11) to be 1 year less mature than the small city girls who are in turn 2½ years less advanced than those in the boarding school. (These differences are determined by adding together those for test results and for chronological age.) Differences of similar type are to be noted for Grade 12. Such greater maturity of attitudes and interests might be expected in the wealthy and sophisticated Eastern boarding school group as compared with results from the small western town.

Another comparison has been made for a single grade of (a) orphan boys with boys from (b) a small city and (c) a median-sized town. The results are as follows:

TABLE VI

Showing Comparative Standing of Three Groups of Boys

	(a)	(b)	(c)
Median Score	63	79	90
Median Emotional Age	15	14½	14
Median Chronological Age	14.3	16.0	16.2

The orphans show when differences in chronological age are taken into consideration an emotional maturity of 2.2 years over the small city boys and of 2.9 years over the town boys. Such results check with observed facts on the maturity of outlook forced upon orphans by circumstances.

As mentioned earlier the tests have been given to certain Indian groups. In this connection it may be said briefly that (a) Indian children have an "emotional retardation" on these tests of 2½ to 3½ years below white children of the same age; (b) the Indian tribes make

maturity scores in relation to their degree of contacts with white standards of behavior, and (c) half-breeds and quarter-breeds make approximately the same scores as full-breeds of the same age—instead of approaching the "white" norms as they seem to do when given tests of intelligence.[11] These items of information seem to check with observed facts concerning the general childishness of the race, the differences in sophistication among the tribes tested, and the tendency of the breeds to "act like" Indians rather than like whites.

Data of a more statistical nature bearing on the matter of validity has also been gathered. (a) In one high school the Dean of Girls was asked to estimate the emotional maturity of such girls as she felt she knew well enough to rate; her estimates correlate with the test scores of the 241 girls she rated with a coefficient of .72. (b) In a boarding school three different people (the English teacher, the dormitory matron, and the vocational counsellor) were asked to make similar estimates for the girls in the school. Their ratings were averaged. This average was found to correlate .67 with the test scores. (c) Scores for a group of 53 seventh grade boys from a boys' school correlated .58 with the averaged ratings of three teachers. All of these correlations between estimated maturity and test score are sufficiently high to suggest some validity to the examination.

A final line of inquiry consisted in having the teachers and counsellors in three different Indian boarding schools make lists of their disciplinary and maladjusted cases, their pupils who were making the most satisfactory progress in school, and their school leaders. Table VII gives typical returns from the children in the sixth grade in one of the schools.

[11] Garth, T. R., "A Comparison of the Mental Abilities of Full- and Mixed-Blood Indians." *Psychological Review*, XXIX, 221-236, 1922. Also "The Intelligence of Mixed-Blood Indians," *Journal of Applied Psychology*, II:268-275, 1927.

TABLE VII

Showing scores made by the problem children, the unusually successful children, and the non-problem, average children in a single grade.

Scores	Problem Cases	Those of High Scholastic Standing	All Others	
290- 99	1			
280- 89			1	
270- 79				
260- 69				
250- 59	3			
240- 49				
230- 39	1		1	
220- 29			1	
210- 19	1		1	
200- 09	2		1	
190- 99	3		2	
180- 89	3		1	
170- 79	2		3	
160- 69	2		2	
150- 59		1	4	
140- 49	2	2	4	
139- 39		1	5	
120- 29		2	12	
110-119		1	8	
100- 09			4	
90- 99			8	
80- 89	2	1	4	
70- 79	3	1	4	
60- 69	2		3	
50- 59	3			
40- 49	2		2	
30- 39	1			
20- 29	2		1	
10- 19	1	1		
Totals	36	10	72	= 118
Number above 160 or below 70	29	1	19	
Per cent above 160 or below 70	81	10	27	

It should be noted that the great majority of the maladjusted cases make scores that are *either* very high *or* very low—that is, they are unusually childish or mature for their grade.[12] None of the "high scholarship" group are immature; as a whole these pupils tend to show an average emotional development.

From another Indian school one of the counsellors picked out the 36 children whose emotional ages on the test scores were most in excess of their chronological age. Concerning each of these children she wrote out her own judgment. She disagrees with the scores in 8 cases out of the 36. The other pupils she characterizes by such statements as: "One of the leaders in our student government," "Very mature girl. Has travelled a good deal and had a broadly varied environment. Parents well educated and fine people," "One of our outstanding leaders. Can handle a group of fifty pupils." Of the 8 cases for which she sees disagreement, 2 are stubborn and intractable, one is immoral, 2 are markedly dishonest, and the other 3 are childish and irresponsible. Except for the last 3 cases the test scores may still be reasonably accurate—the misconduct being a reaction of an overly-mature pupil to regulations she regards as childish.

From the last of the three Indian schools there was obtained data which corroborated the two reports just given, but in addition, the superintendent wrote the following:

"My teachers find the test results very interesting and feel that they may help to explain the conduct of some of the pupils who have been and likely will continue to be discipline problems. In a number of cases the test indicates to some extent the cause.

[12] Since this report was sent the writers, the superintendent of the school has investigated the extreme cases that had never given any trouble and has written that the counsellors have found maladjustments in most of the extreme instances, only the types were such as to lead to quiet isolation rather than overt delinquency.

"There is one curious fact with regard to the test results or scores that we have found. It is that of the ten or twelve students with highest and about that many with the lowest scores, two or three excepted, are the outstanding students in school in scholarship and social activities. That peculiar fact extends so far as to include all, with the exception again of two or three, those who are considered the leaders in school activities of whatever nature they may be."

In conclusion it would seem as if—from one source and another—there were ample justification for some degree of faith in the validity of the test scores. Even though it may not always be clear just what extreme variations may indicate, it does seem clear that they show *something* that is of importance in conditioning the behavior of school pupils.

IV. SUMMARY

(1) The Interest-Attitude Tests are revisions of the X-O Tests and are based on careful and extensive investigation into the power of each item to reflect emotional maturity. The tests are scored so as to be as differential of age as possible, the total point variation being from —200 to +520.

(2) Norms are presented by both grade and age for each sex. Special emphasis is put upon the use of "emotional ages" derived from the raw scores. It is hoped that such a concept may prove of great value in understanding individual children.

(3) The tests are shown to have a remarkably high reliability. Data on validity from a number of varied sources are presented. It seems reasonable to conclude that the tests are both reliable and of some validity.

(4) Further articles dealing with specific uses of the scale will soon appear.

WHAT ONE COLLEGE THINKS CONCERNING WAR AND PEACE

JOHN JEFFREY SMITH
Muskingum College

College students are supposed to develop into leaders. Their thoughtfulness or lack of it is a matter of public concern. The public has a special concern as to student conclusions on important social problems. One of the social problems on the solution of which depends the happiness and even the life of multitudes is: By what means can nations maintain their integrity and promote their security?

THE PROBLEM

The war method of promoting national security no longer is taken for granted by all schools of thought. Some citizens favor the war method. Some regret the necessity of war but see no way out of the tangle of national relations except by the use of military force. One group of thinkers is formulating an entire philosophy of group assertion and defense entirely apart from the involvement of war. The question of national security is being isolated and considered. Rather definite schools of thought are taking shape.

The writer ventures to designate the present schools of thought as follows: (1) Extreme Militarism; (2) Moderate Militarism; (3) Idealistic Pacifism; (4) Realistic Pacifism. The extreme militarist assumes that war is not only necessary but also desirable: individual and national character is moulded through its struggle and sacrifice. The moderate militarist is likely to recognize the burden and waste of war. But he is convinced that

under present national conditions we must expect wars to occur occasionally. Hence his conclusion is that we should make a reasonable amount of military preparation. The idealistic pacifist denounces war as wrong and its further practice as both unnecessary and unthinkable. He would have us trust God and man and at once begin to apply idealistic principles to national affairs. The realistic pacifist faces the world of actual group struggle in a practical way. He condemns war on practical grounds. He finds it ineffective and suicidal. He trusts other types of force to produce the needed group assertion and defense.

Which of these schools of thought is winning out so far as the college teacher and student is concerned? The correct answer to this question must constitute valuable information.

AN APPROACH

The college student or faculty member does not exist. College students and faculty members exist in individual colleges. Let us assume that a particular college represents college opinion. The college selected for this study probably is much like other American colleges. We have no way of knowing to what extent college opinion represents the opinion of other groups of American citizens.

During March, 1932, the writer sought to get reactions from the students and faculty of Muskingum College. With the assistance of some students and faculty members he prepared the statements involved in Table I. These statements were written to represent the four points of view mentioned above. Each school of thought has twelve statements favorable to it. Each statement in every one of the groups is written in such a way as to encourage a member of that school to mark the statement as true.

The statements were marked on the three option basis —true, false and doubtful. The instruction on the test

sheet was as follows: *T* means true; *F* means false; *D* means I am doubtful as to the answer. Mark the statements as *you* think about it individually. The sheet need not be signed.

THE FINDINGS

Of the test sheets returned three or four were discarded because the sheet itself was defective or because the one marking it evidently had not finished the task. In addition to these, 518 sheets were marked by students and 37 by faculty members; this in a school of about 650 students and 50 faculty members.

Table I shows the summary findings of students and faculty members listed statement by statement. There is shown the number of answers marking each statement true, false or doubtful and the number omitting to mark each statement. Corresponding percentages are shown; these percentages are computed on the basis of the 555 sheets marked. The table reads as follows: 22 individuals or 3.96 per cent of the 555 students and faculty members marking the sheets, marked statement No. 1 as true; 498 individuals or 89.73 per cent marked it false; 26 persons or 4.68 per cent were doubtful; 9 individuals or 1.62 per cent omitted to mark statement No. 1. The table lists the percentages on the same line as the number of the statements and gives the number of individuals on the line above.

Table II gives the findings as to the schools of thought summarized as to students (men, women and totals), faculty members and for students and faculty members together. Attitudes toward militarism are shown above the horizontal line and toward pacifism below that line. The two schools of militarism are shown both separately and as one school; the same holds for the two pacifistic attitudes or schools. The table is complete both above and below the central horizontal line. In other words Militarism is computed on the basis of 100 per cent and

TABLE I*

Summary Findings Tabulated by Individual Questions

			True	False	Doubtful	Omitted
War is justified because it develops courage and loyalty	1.	N	22	498	26	9
		%	3.96	89.73	4.68	1.62
Any war is wrong from the Christian point of view	2.	N	230	243	80	2
		%	41.44	43.78	14.41	.36
The nations should boycott trade—except in foods—of a national war aggressor	3.	N	282	119	122	22
		%	50.81	21.44	21.98	3.96
We should keep the U. S. navy at about its present strength	4.	N	233	185	108	29
		%	21.44	33.33	19.46	5.23
War is a necessary expression of man's fighting nature	5.	N	37	458	31	29
		%	6.67	82.52	5.59	5.23
Public or world opinion is sufficient defense against national military aggression	6.	N	116	254	116	19
		%	20.90	45.77	20.90	3.42
If war threatens a general convention of diplomats should be called	7.	N	439	50	66	0
		%	79.10	9.00	11.89	0.00
War is undesirable but at present necessary	8.	N	71	416	60	8
		%	12.79	74.95	10.81	1.44
War is a necessary part of a nation's struggle for existence	9.	N	80	392	51	32
		%	14.41	70.63	9.19	5.77
If called upon to bear arms in war I would declare myself a conscientious objector	10.	N	185	227	139	4
		%	33.33	40.90	25.05	.72
Moral condemnation of a militaristic nation by large social groups is a powerful social force	11.	N	370	75	110	0
		%	66.67	13.51	19.82	0.00

		N	108	395	43	9
We should seek to regulate rather than to abolish war	12.	%	19.46	71.17	7.75	1.62
The blood sacrifice made by the soldier is of the Christian type		N	83	320	139	13
	13.	%	14.95	57.66	25.05	2.34
		N	339	109	71	36
The practice of war does not defend a nation's honor	14.	%	61.08	19.64	12.79	6.49
The conscientious objector to war may consider himself a loyal citizen		N	386	94	69	6
	15.	%	69.55	16.94	12.43	1.08
		N	262	156	133	4
Extreme pacifism endangers national security	16.	%	47.21	28.11	23.96	.72
		N	182	277	84	11
Patriotism demands that the citizen participate in war	17.	%	32.79	49.91	15.14	1.98
		N	344	118	57	36
National preparedness makes war more likely	18.	%	61.98	21.26	10.27	6.49
Christianity provides resistance to evil by means other than war		N	480	19	36	10
	19.	%	86.49	3.42	6.49	1.80
		N	166	252	131	6
A right national cause justifies the practice of war	20.	%	29.91	45.41	23.60	1.08
A citizen of a democracy should submit his conscientious objections to the will of the majority		N	141	286	124	4
	21.	%	25.40	51.53	22.34	.72
An international adjustment always is made more difficult after the fighting of a war		N	448	43	61	3
	22.	%	80.72	7.75	10.99	.54
The United States should become a member of the World Court		N	354	76	134	0
	23.	%	62.16	13.69	24.14	00.00

* Table I was published in *The World Tomorrow* under date of June, 1932.

TABLE I (Continued)

			True	False	Doubtful	Omitted
		N	71	345	127	2
The United States never has fought an unjust war	24.	%	12.79	62.16	22.88	.36
		N	330	66	144	15
The Bible predicts wars until the final coming of Christ	25.	%	59.45	11.89	25.95	2.70
Normally we expect war to endanger human life and		N	482	41	26	6
property more than to protect it	26.	%	86.85	7.39	12.07	1.08
An army or navy never should fight beyond the boun-		N	146	256	152	1
daries of the home nation	27.	%	26.31	46.13	27.39	.18
Military training should be compulsory in state uni-		N	92	382	72	15
versities	28.	%	16.58	69.00	12.75	2.70
		N	222	208	97	34
Military experts should determine military budgets	29.	%	40.00	37.48	17.48	6.13
Investments in foreign countries should not be protected		N	353	121	81	0
by warfare	30.	%	63.60	21.80	14.58	00.00
		N	251	113	179	12
The United States now should join the League of Nations	31.	%	45.23	20.36	32.25	2.16
		N	160	231	152	12
The United States should arm up to its treaty rights	32.	%	28.83	41.62	27.39	2.16
		N	21	462	46	26
War is necessary to avoid overpopulation of nations	33.	%	3.78	83.24	8.29	4.69
Missionaries in foreign countries should not be protected		N	279	162	107	7
by war methods	34.	%	50.27	29.19	19.28	1.26
The military budget of the United States should be re-		N	322	107	122	4
duced very greatly this year	35.	%	58.02	19.28	21.98	.72
		N	230	170	128	27
I believe in an international army to act as a police force	36.	%	41.44	30.63	23.06	4.86

		N	19	448	61	27
To die in battle is to guarantee the soul's salvation	37.	%	3.41	80.82	10.99	4.83
The national government has no moral right to compel its		N	340	132	64	19
citizens to wage war	38.	%	61.26	23.78	11.53	3.42
		N	282	131	130	12
Abolish now military armaments for offensive purposes	39.	%	50.81	23.60	23.42	2.16
		N	181	225	139	10
Nations should pay high honors to their military leaders	40.	%	32.61	40.54	25.05	1.80
		N	127	282	134	12
The command against killing does not apply to warfare	41.	%	22.88	50.81	24.14	2.16
		N	507	12	23	13
I consider loyalty to God superior to loyalty to nation	42.	%	91.35	2.16	4.14	2.34
		N	358	74	107	16
War is an evil national practice which we can abolish	43.	%	64.50	13.33	19.28	2.88
Military armaments must be reduced very gradually over		N	286	106	124	37
a long period of time	44.	%	51.53	19.10	22.34	6.67
		N	140	243	157	15
The nation's honor should be defended at any price	45.	%	25.23	43.78	28.29	2.70
		N	436	35	41	43
War involves ordinarily all kinds of moral evils	46.	%	78.56	6.31	7.39	7.75
		N	393	77	77	8
Organized religious bodies should definitely condemn war	47.	%	70.81	13.87	13.87	1.44
		N	150	348	55	2
The common citizen can do very little to oppose war	48.	%	27.03	62.70	9.91	.36

NOTE: The following instructions preceded the marking of the sentences—*T* means true; *F* means false; *D* means I am doubtful as to the answer. Mark the statement as you think about it *individually*. The sheet need not be signed. (The students spent from 15-20 minutes in general assembly—one for boys and one for girls—marking the statements; the sheets were marked by the faculty apart from a public meeting.)

Pacifism on the basis of 100 per cent; in the case of the two subdivisions the total per cent is 50. The votes omitted are shown in Table I and are not repeated in Table II; it follows that the summary percentages are not exactly correct.

Table II can be read with profit along both horizontal and perpendicular lines. Read the first horizontal line as follows: the 254 male students marked 512 of the total number of their militaristic votes as doubtful to extreme militarism. The 264 women students marked 471 of their total militaristic vote doubtful to extreme militarism. The second horizontal line reads as follows: the 512 male students' votes designated as doubtful to extreme militarism is 8.4 per cent of the total possible militaristic vote. The reader must remember that the number representative of a group must be multiplied by 24 (2 times 12) because each subject voted on two militaristic schools and each school had 12 statements favorable to it; what is true for militarism above the line is true for pacifism below it. In like manner the 471 votes designated by the 264 women students as doubtful to extreme militarism is 7.43 per cent of their possible militaristic vote.

The reading of the first perpendicular column of Table II is as follows: 254 male students gave 512 votes, which is 8.40 per cent of their total militaristic vote, as doubtful to extreme militarism. These same male students gave 690 votes or 11.32 per cent of their militaristic vote as favorable to extreme militarism. Their vote opposed to extreme militarism was 1720 which is 28.22 per cent of their total militaristic vote. Continuing the column, there is shown the vote on moderate militarism and the total vote on militarism. In like manner below the line is shown the vote on the two schools of pacifism; the vote is shown first on realistic pacifism, then on idealistic pacifism, and finally on pacifism as such.

TABLE II

Totals Expressed in Group Attitudes

		Total Students			Total Faculty	Total Students and Faculty
		M	W	T	M & W	M & W
	S	254	264	518	37	555
D to	N	512	471	983	104	1087
E M	%	8.40	7.43	7.90	11.71	8.16
For	N	690	668	1358	41	1399
E M	%	11.32	10.54	10.92	4.61	10.50
Vs.	N	1720	1958	3678	255	3933
E M	%	28.22	30.90	29.59	28.72	29.53
D to	N	511	864	1375	139	1514
M M	%	8.38	13.64	11.06	15.65	11.37
For	N	1096	838	1934	95	2029
M M	%	17.98	13.23	15.56	10.70	15.23
Vs.	N	1378	1665	3043	187	3230
M M	%	22.60	26.28	24.48	21.06	24.25
D to	N	1023	1335	2358	243	2601
M	%	16.78	21.07	18.97	27.36	19.53
For	N	1993	1483	3476	136	3612
M	%	32.69	23.41	27.96	15.32	27.12
Vs.	N	3098	3623	6721	442	7163
M	%	50.82	57.18	54.06	49.77	53.78
D to	N	584	658	1242	87	1329
R P	%	9.58	10.39	9.99	9.80	9.98
For	N	1780	1990	3770	300	4070
R P	%	29.20	31.41	30.32	33.78	30.56
Vs.	N	677	476	1153	31	1184
R P	%	11.11	7.51	9.27	3.49	8.89
D to	N	371	396	767	104	871
I P	%	6.09	6.25	6.17	11.71	6.54
For	N	1815	2133	3948	241	4189
I P	%	29.77	33.66	31.76	27.14	31.45
Vs.	N	786	571	1357	78	1435
I P	%	12.89	9.01	10.92	8.78	10.77
D to	N	955	1054	2009	191	2200
P	%	15.67	16.64	16.16	21.51	26.52
For	N	3595	4123	7718	541	8259
P	%	58.97	65.07	62.08	60.92	62.00
Vs.	N	1463	1047	2510	109	2619
P	%	24.00	16.52	20.19	12.27	19.66

Interpretation: S means subjects marking the test; D to E M is doubtful to extreme militarism; M M is moderate militarism; R P realistic pacifism; I P idealistic pacifism; M is the sum of E M and M M; P is the sum of R P and I P.

AN INTERPRETATION

Probably it is best to let each one make his own interpretation of these findings. It is best to allow this in a cheerful spirit because there is no way to prevent it; each one is an individual and hence will have an individual point of view and make an individual interpretation. We shall be content to point out certain conclusions which seem discernible from an objective angle. In quoting percentages from the table we quote in whole numbers.

Present day students are not assuming war to be an inevitable factor in human life; it is not considered a seasonal diversion of kings. Only 7 per cent say war is a necessary expression of man's fighting nature; 82 per cent say that it is not. That war is an evil national practice subject to human control is affirmed by 64 per cent and denied by only 13 per cent. That we must find some other protection for our foreign investments is affirmed by 63 per cent and denied by 22 per cent. Even in a college of great missionary zeal 50 per cent affirm that missionaries should not be "protected" by war methods; 29 per cent believe that they should. Table I shows the percentages that are doubtful in these cases.

Can the common citizen do anything to make war less likely? Some 62 per cent believe that he can and 27 per cent that he can not. How far has this conviction gone with the college student and faculty member in the way of a resolution to oppose the war system? Einstein's estimate of 2 per cent necessary to defeat the war system has been quoted widely. Our answers show that 33 per cent of the college population plan to declare themselves conscientious objectors; 41 per cent do not so plan and 25 per cent are in doubt as to their stand on this matter.

Certain questions concerning war are fairly well worked out in the realm of college thinking. Some of the findings are rather surprising. A group vote in the ratio of 86 to 4 indicates the conviction that Christianity makes provision for resistance to evil by means other than war. In the ratio of 80 votes to 7 the conclusion is expressed that war makes international adjustments more difficult. That war endangers more than it protects human life and property is a proposition favored by 86 per cent and opposed by 7 per cent. To the suggestion that war is necessary to avoid overpopulation of nations, 4 per cent vote Yes and 83 per cent vote No. The present day college student is not in doubt as to whether he owes superior loyalty to God or to nation; 91 per cent favor God and 2 per cent favor nation. The proposal that war involves all kinds of moral evils is favored by 78 per cent and opposed by 6 per cent. Less than 4 per cent favor the idea that war is justifiable because it develops courage and loyalty; 89 per cent oppose this contention.

Is there any marked contrast in the thought of college men and women concerning war and peace? Some differences are discernible. Doubt as to the moderate militaristic program is expressed by the women students to the extent of 13 per cent and by the men to the extent of 8 per cent. Militarism is favored by 33 per cent of the men and by 23 per cent of the women. As consistency would seem to demand, a larger per cent of the men than of the women oppose the realistic peace program; the percentages here are 11 as compared to 7. Peace is favored by 65 per cent of the women and by 59 per cent of the men. All such statements should be read in the setting of their table.

The faculty members show somewhat more tendency to doubt than do the students; perhaps they read more background into the statements. The faculty per cent favorable to extreme militarism is 5 as compared to 11

on the part of the students. In the case of moderate militarism again the vote is lower; the percentage is 11 as compared to 16. Only 3 per cent of the faculty oppose realistic pacifism as compared to 9 per cent of the students. Peace as interpreted by the test under consideration receives the opposition of 12 per cent of the faculty and of 20 per cent of the students.

The study shows certain facts concerning the schools of thought. We speak here of the total faculty and student vote. Stating the schools in the order in which they are favored they read as follows: Idealistic Pacifism, Realistic Pacifism, Moderate Militarism, Extreme Militarism; the percentages listed in the same order read: 31, 30, 15 and 10. The vote opposed to the schools shows opposition in this order; Extreme Militarism, Moderate Militarism, Idealistic Pacifism, Realistic Pacifism; the list of percentages in this order reads: 29, 24, 11 and 9. The only inconsistency concerns realistic and idealistic pacifism; the idealistic is most favored on the positive vote and most opposed on the negative vote. The inconsistent vote is by less than one per cent and possibly is not significant. The total vote for peace is 62 per cent and for militarism 27 per cent. The total vote against militarism is 54 per cent and against peace 20 per cent.

The study of individual reports shows considerable inconsistency. Perhaps individual consistency cannot be expected in the case of a complex question concerning which there is being manifest a marked change of social attitude. Certain individuals expressed their consciousness of inconsistency. The extent of the region of doubt is inviting to those who have an educational message to deliver.

HABITS OF THE RADIO AUDIENCE*

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In this study I have analysed the data secured by the *Omaha World-Herald*, in a telephone and personal interview survey of its city. The survey was conducted as follows: On every week day during the week of April 20, 1931, interviews were made between the hours of 6:30 p. m. and 10:00 p. m. The person called was asked whether he had a radio, whether the radio was turned on, what was the name of the station to which he was listening, what program was he receiving, and what product was advertised. In this study we are only interested in the habits of those persons who owned radios; the total number of radio set owners interviewed was 1,762.

It will be seen by looking at Table I that there is a surprising uniformity in the percentage of sets operated at the different hours during which the survey was made. Starting at 6:30 approximately 40 per cent of the sets were on. The number of radio receivers turned on became greater until at 9:00 o'clock somewhere between 50 and 60 receivers out of every hundred were tuned to stations.

* The data used in this study were placed at the author's disposal through the courtesy of the *Omaha World-Herald*, and C. H. Sundberg, of the Major Markets Newspapers, Inc.

This investigation into the habits of radio listeners was made possible through the interest of the Payne Fund, of New York City, in radio education.

TABLE I

Radio Habits of the Audience by Quarter Hours

Period of Time		Tenths of radio sets turned on.	Tenths of Listeners operating radios able to name stations.	Tenths of Listeners operating radios able to name program.	Ratio of programs named wrongly to those right, in tenths.
From	To				
6:30	6:44	4	6	2	1
6:45	6:59	4	8	5½	3
7:00	7:14	5	8	4	1
7:15	7:29	5	9	5	1
7:30	7:44	4½	7	3	1½
7:45	7:59	4	9	4	1½
8:00	8:14	4	6	3	2
8:15	8:29	5	8	3	1
8:30	8:44	5	8	3	2
8:45	8:59	6	8	4	2
9:00	9:14	5	8	4½	1
9:15	9:29	6	8	3	0

Table I shows that on the average eight people out of ten knew the station to which they were listening. The listener's knowledge of the station to which he was tuned seemed to be much the same whatever the hour was. Knowledge of programs—or program orientation, as it might be called—differed little with the hour of the evening and therefore bore no relation to any supposed occupations, such as washing dishes, etc. As a further factor in listener psychology the relation of the number of wrong programs mentioned to the total number of the programs mentioned was studied. Here, again, no regular relationship between time and this ratio was found.

In answering the questions asked by the interviewer, listeners did not show any too great evidence of radio-mindedness. Since most of the listeners were tuned to either of two stations in Omaha, and the programs of these stations could be checked with some accuracy, the number of impossible or incorrect program mentions was secured. These were tabulated for the two Omaha stations only. Of the listeners mentioning programs, 22 per cent gave the names of programs which were on the same evening but not at the time the interview was made; 7 per cent mentioned programs which were given on some other day; and 4 per cent gave the right program but referred it to the wrong station. Therefore, 31 per cent of the people mentioning programs were disoriented in some way.

These errors were studied to reveal any tendencies on the part of the radio audience to anticipate programs or mention them after they had been given. Twenty-six persons mentioned programs before they were on the air, and 35 mentioned programs after they had been broadcast. There was a definite relation between the number of wrong mentions and the length of the interval separating the interview from the time the program actually came on the air. The decrease in mentions, after a program had been given, was more rapid than the increase in the number of anticipated programs mentioned before the program was on the air. The impression produced by a program as far as causing a listener to think he is still hearing it is concerned lasts for about an hour and ceases rather abruptly.*

A great many interviews were made at the even hour, half-hour, or quarter-hour—that is, at 7:00 o'clock, 7:15, 7:30, and 7:45. One may properly be curious to find out what programs people mentioned at these times, since the hour, half-hour, or quarter-hour is a sort of

* Lumley, F. H. "Anticipation and Erroneous Responses," *Journal of Experimental Psychology*, 1934, *17*.

interval between two programs. We must, therefore, count either the program which preceded, or the program which is to follow, as correct. How often does the listener give the name of programs he has just heard as compared with those which he is about to hear? If we know this we will have some measure of the publicity effect of the program's previous broadcasts, of its newspaper advertising, of its opening salutation, and of its other means of commanding the attention of the audience. Bevis and Amos* have shown in a survey of Evanston, Illinois, that 39.8 per cent of the listeners were able to name the advertiser during the first half of the program, while 40.6 per cent could name the advertiser during the second half of the program. In the case of Omaha we find that there is no significant difference between the number of programs mentioned at the first of the hour and the number of programs given at the end. The figures show that of 100 operating radios the listeners to 20 named the program they had just heard, and the listeners to 20 named the program which was to follow. This result is that expected by chance and seems to show that publicity and opening announcements are as important as the announcements the listener hears all through the program. The results agree rather closely with those given above for Evanston, even in the total percentage of listeners able to name programs. It is also interesting to note whether more programs were named at these even intervals when the listener had an opportunity to name one of two programs. The figures show no evidence at all that more programs were named at this time.

I have long wished to find some means of discovering whether more persons listen toward the end of a pro-

* Bevis, J. and Amos, J. O. *A Study of the Influence of Newspaper Publicity on the Identification of Radio Advertisers*, M. A. Thesis, Northwestern University, 1932.

gram, or tune out as the program progresses. Do listeners tune in just before the program they want to hear comes on or just a little bit after? Naturally, the results in any particular case would depend upon the program given. In this study only the data in the mass have been analyzed with reference to this factor. The interviews were grouped in five minute periods and all those interviews which occurred on the even hours, fifteen minutes, or half hours, were put by themselves. Thus a record was obtained of the interview results for 7:00 o'clock, for 7:01 to 7:05, for 7:06 to 7:10, for 7:11 to 7:14, for 7:15, for 7:16 to 7:20, etc. The time between 6:30 and 9:30 was thus sub-divided into 49 periods, or groups of interviews. Examining these 49 periods the results did not show anything unusual because the periods were more or less a measure of individual programs, even with the results for the different days of the week combined. However, after the corresponding periods for each half-hour were put together certain trends were revealed. This information is given in Table II which is read as follows: First row—at the even hour, or half-hour, between 6:30 and 7:59, there were 43 radios out of every hundred turned on; between 8:00 and 9:30, at the same time, there were 47 out of one hundred turned on; and for the whole period from 6:30 to 9:30, there were 46 radios turned on. Second row—in the first five minutes after the beginning of any hour or half hour—that is, from 01 to 05, or 31 to 35, there were 57 per cent of the radios turned on between 6:30 and 7:59; and for the whole period from 6:30 to 9:30, there were 53 per cent. Results are also given for quarter-hour periods, at the bottom of the table, and show that 49 per cent of the radios on the average were turned on at every quarter-hour; 52 per cent were turned on at every five minutes following the even quarter-hour, and 37 per cent were turned on for the four-minute period just preceding the new quarter-hour.

TABLE II
SUMMARY TABLE OF LISTENERS' HABITS WITH RESPECT TO TIME

The interviews on which this table is based were made from 6:30 to 9:30 P. M.
Total number of radio-set owners interviewed—1762

Grouping of Interviews by Periods			Per Cent of Radios Turned On			Listeners Operating Radio Who Could Name Station (In Tenths)			Listeners Operating Radio Who Could Name Program (In Tenths)			Per Cent of Listeners Operating Radios, Naming Wrong Programs	Ratio of Wrong Programs to Right Programs (In Per Cent)
	From	To	6:30-7:59	8:00-9:30	6:30-9:30	6:30-7:59	8:00-9:30	6:30-9:30	6:30-7:59	8:00-9:30	6:30-9:30	6:30-9:30	6:30-9:30
By Half-Hour Periods		00*	43	47	46	8	8	8	4	4	4	10	20
	01	05	57	50	53	7	9	8	2	5	4	20	25
	06	10	47	53	50	8	6½	7	3	3	3	05	10
	11	14	33	37	35	5	6	5½	2½	2	2	00	00
		15	43	60	52	8	8	8	4	3	3	05	15
	16	20	47	57	52	7½	8	8	3	4	4	03	10
	21	25	43	60	52	9	8	9	6	3	5	15	20
	26	29	27	53	40	10	9	9	6	4	5	15	15
By Quarter-Hour Periods		00			49	8	8	8	4	4	4	10	20
	01	05			52	7	9	8	3	5	4	10	17
	06	10			51	9	7	8	5	3	4	10	15
	11	14			37	8	7	7½	4	3	4	07	07
Average					47			8			4	09	14

* also = 30; 01-05 includes 31-35; and so on. 00 includes all interviews made on the even hour or half-hour

The results in Table II show the per cent of persons with radios who had these radio sets turned on. Table II also shows the per cent of people who had radio sets turned on and could name the station to which they were listening. It shows, further, the per cent of persons with radio sets turned on who could name the program to which they were listening. It shows the per cent of listeners who named wrong programs and the ratio of the wrong programs named to the total number of programs named. It is a curious fact that in all these results the period just preceding the quarter or three-quarter hour seemed crucial. For example, we find in considering the per cent of radios turned on that there is always a drop if the period just precedes the quarter hour. This is consistent and is shown whether the figures are taken for 6:30 to 7:59, or from 8:00 to 9:30, and also when both times are taken together. It is shown for the period which comes either before the quarter-hour or just precedes the half-hour. Otherwise the figures for the other periods are closely similar with perhaps a slight drop in the number of radio sets at the even 15-minute period. It is hard to interpret such results because a number of audience habits could cause them. They may mean that toward the end of a program people tune out and that they do not tune in to a program until just after it has started. Such habits may be a reflection on the fact that most advertising is done at the end of a program, or just at the beginning. The listeners avoid hearing such advertising by tuning in on programs in the way indicated by these figures.

Since the per cent of listeners able to name their stations was computed on the basis of the actual number of radios turned on, there should have been no necessary relation between the results for the per cent of radios turned on and the per cent of listeners naming stations. Here we find that the figures show no special differences for the periods when taken by quarter-hours other than

a slight lessening of the ability to mention the station just before the quarter-hour. But when the periods are considered by half-hours we find that there is distinct lessening in the ability to name the stations just before the even 15-minute period, and a distinct heightening just before the even 30-minute period. This means that as the half-hour passes the listeners are progressively less able and then more able to name the station to which they are listening. These figures show no special relationship to the times at which the station identity is announced over the air.

There is the expected relationship between the per cent of listeners who could name the station and the per cent of listeners who could name the program to which they were listening. Here again we note—strangely enough—that in a half-hour period the listener's memory for the radio program becomes progressively worse as the even 15-minute period is reached and then progressively better as the even 30-minute period is reached. It is hard to see why this is so since there are now so many 15-minute programs on the air and mentions of the name of the program occur at both the beginning and the end. However, the results are consistent. Those from 6:30 to 7:59 agree with the figures from 8:00 o'clock to 9:30. Naturally, there is a corresponding relationship between the per cent of listeners who named wrong programs and the per cent of listeners who could name programs. However, the ratio of the wrong programs to the right programs varies in the same way. Just before the quarter hour the listeners named fewer programs, and they named fewer wrong programs in comparison to the right programs named.

If there had been more interviews it might have been possible to study the relationship between programs and station audience with reference to specific times and programs.

For example, it would have been interesting to find out what happened in an instance such as this: Station A has a very good program at 8:00. At 7:45 and at 8:15 it has mediocre programs. Station B has mediocre programs throughout this entire period from 7:45 to 8:30. Will the results show that the audience starts turning to Station A before the 8 o'clock hour, or just at the 8 o'clock hour, or slightly after the 8 o'clock hour? Does the audience stay with Station A after 8:15 or does it turn off abruptly? Does it go to Station B? What would be the results if there were an excellent program on Station B at 8:15? Would the audience change over at once? It would not be hard to find such situations in a city where there are two prominent competing radio stations both carrying chain programs. If sufficient interviews were made or if records could be made of the times at which the sets were turned on or changed, results could be obtained with reference to this matter.

From the Omaha data it was only possible to observe what happened in certain cases. In Omaha there were two stations which commanded most of the audience. At certain times practically all the audience shifted to one station. After the General Motors' program on Station A, there was an abrupt shift to Guy Lombardo on Station B. Not a single listener stayed with Station A after the beginning of the Lombardo hour. Station B, however, had several listeners tuned in before Lombardo came on. When the Rudy Vallee program was on Station A, listeners came over from the other station to Station A, until at the end of the hour there was no audience for Station B. At the end of the Rudy Vallee program the audience started shifting. The True Stories program captured practically all of the audience for Station B and after it was over people continued to say that they were listening to the True Story program.

As a final word of caution it must be emphasized that the figures in this study are for only one city and in no

sense can they be taken as a sampling of general audience reaction. Furthermore, it is possible that certain errors have occurred with reference to recording the times of the interviews. The method of analysis and results are given here primarily to encourage further analysis by others who have such data at their command.

In conclusion the results for Table II seem to show that in the period just preceding the quarter-hour there are fewer radio sets turned on than at other times, and those people who do have their radio sets turned on are less able to name either the station or the program to which they are listening. Just before the half-hour there are fewer radio sets turned on, but the listeners are better able to name the station and the program than at other times. These results are true whether the 6:30 to 7:59 period is taken or the 8:00 to 9:30 period.

A STUDY OF THE SCHOLASTIC PROGRESS OF COLLEGE PROBATIONERS

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Reports of the progress of probation students in remedial classes have appeared frequently in recent years. The reader may quite appropriately ask what progress do these students make in the years succeeding the remedial work. With this question in mind the writer has assembled the data presented in this paper.

The probation student in the College of the University of Pittsburgh before 1928 so far as the writer has been able to determine had been left to prove his own ability through creditable scholastic performance which would warrant his remaining in school. At least no systematic attempt was made to diagnose difficulties and apply remedial measures. At the beginning of the second semester of the year 1928-1929 probation freshmen were required to enroll in a special class designed to assist them in their work. The scholastic progress of these students has been followed to the close of their fourth semester in the College. We had hoped to consider the scholastic marks of these students until they had either withdrawn or been graduated from the College but at the beginning of the fifth semester such a small percentage of the original number was enrolled that we considered further inquiry of doubtful value. In order to make reliable comparisons with a control group we have considered only the records made in consecutive semesters.

The 1928-1929 group, herein designated as the TRAINING group, were freshmen on probation in the College during the second semester of that year because of the poor quality of their first semester marks. The group which we designate as the CONTROL group were freshmen in the year 1927-1928. Each group represents the eighty-one students who made the poorest scholastic records of the freshman class in their respective first semesters and continued in the College during the second semester.

Scores on the Thorndike Intelligence Examination for College Freshmen attest to the similarity of the groups considered here. The average scores for the groups were, CONTROL 53.7 standard deviation 16.11 and TRAINING 52.7 standard deviation 15.75. According to Pearson's coefficient of variation the TRAINING group was 99.7 per cent as variable as the CONTROL group.

The type of courses represented in the work of each group was very similar. The required courses for freshmen limited the choice of courses in such a manner that there were no statistically significant differences in the amount of work carried by each group in the different academic fields. In the third and fourth semesters the division of courses among the various academic fields was practically the same for each group. The greatest difference in these last semesters was that the TRAINING group carried a total of 5 to 7 per cent more natural and exact science and from 5 to 7 per cent less social science than did the CONTROL group.

The similarity of the scholastic marks of the two groups in their respective first semesters can be seen in the following table.

TABLE I

First Semester Percentages of Credit Hours Graded with the Various Class Marks

Class Marks	A	B	C	D	F
TRAINING group	0	2.93	32.35	51.0	13.72
CONTROL group	0	3.22	32.14	49.3	15.33

The training group in this study was the class under consideration in the Carnegie Foundation Study in Pennsylvania. When this class entered the College they were given tests to appraise their ability and preparation. Special lectures were given to acquaint the students with their work in the University. During the first semester individual conferences for students having scholastic difficulty were scheduled with the College Personnel Officer and others interested in their progress. The greater part of this assistance probably came too late in the semester to affect the marks for that semester.

Fourteen of the 81 students in the TRAINING group were scheduled for remedial reading classes in the School of Education. The remaining students in the group were scheduled in two one hour per week classes in the Department of Psychology. The work in these two sections was directed by the writer with the help of a graduate student. In the group meetings we discussed the techniques of study which seem necessary for successful performance in any subject of the curricula. The students were given exercises which were to be a part of their preparation in each of the classes for which they were enrolled. These exercises were not given as additional facts to be learned but rather as practice in methods of studying. Primary emphasis was placed on the student's ability to check his own preparation in any course before attending lecture or examination. We attempted to appraise each individual student's work and to assist the student in diagnosis of his individual diffculties

and in making plans to correct the difficulties if possible. Individual shortcomings were faced squarely and attempts to compensate for deficiencies were planned. Our attempts to aid the students were not confined to the specific business of studying. We considered the individual's adjustment to various phases of living, both on and off the campus. The problems presented by some of our students were not problems of mental adjustment and these students were directed to individuals who were in position to give the desired assistance. For the most part, however, our group was below the level of academic ability, as measured by tests, which is ordinarily considered satisfactory for successful performance in college work.

The following table shows the progress of the TRAINING group in second semester scholastic marks compared with the marks of the CONTROL group in their second semester.

TABLE II

Second Semester Percentages of Credit Hours Graded with the Various Class Marks

Class Marks	A	B	C	D	F
TRAINING group	2.13	15.73	41.6	30.84	9.6
CONTROL group	.18	7.53	31.2	37.23	23.85
Difference divided by the standard error of the difference	4.3	6.1	5.1	3.2	9.4

The improvement of the scholastic marks of the TRAINING group in the second semester is quite evident. The differences in percentages of marks of any grade denote statistically true differences between the marks of the two groups. In spite of the improvement of the TRAINING group their marks are massed toward the low end of the distribution. In terms of quality points per hour the average gain of the TRAINING

group was .55 points per hour.[1] The actual average of .67 quality points per hour for the second semester falls below the average which is required for graduation.

The following facts present a further comparison of the scholastic performance of the two groups. Seventeen students in the TRAINING group and 48 in the CONTROL group made as poor, or poorer, record in the second semester as they did in the first. Seven students in the TRAINING group as against 23 in the CONTROL group passed all courses in the first semester and failed some work in the second semester. Fourteen students in the CONTROL group and 21 in the TRAINING group failed some courses the first semester and passed all second semester courses. Thirteen students in the TRAINING group and 27 in the CONTROL group failed some courses both semesters. Seven students in the CONTROL group and 24 in the TRAINING group made quality points equal to the number of hours of credit earned in the second semester.

Approximately 6 per cent of the credit hours carried by each group in the second semester were in courses failed the previous semester. About one-third of the repeated work was failed a second time and the average quality point value of that passed was less than the average quality point value of the other work carried.

Sixty-three per cent of the CONTROL and 67 per cent of the TRAINING group enrolled for the third consecutive semester. The average Thorndike Intelligence Examination scores for the third semester groups were 54.7 and 55.1 for the TRAINING and CONTROL groups respectively. Table III shows the comparison of class marks for the third semester.

[1] Each credit hour of 'A' grade merits 3 quality points, each hour of 'B' 2 points, and each hour of 'C' 1 point. No quality points are given for 'D' work and for each hour of work failed 2 quality points are subtracted from the student's record.

TABLE III

Third Semester Percentages of Credit Hours Graded with the Various Class Marks

Class Marks	A	B	C	D	F
TRAINING group	.81	13.2	34.6	35.0	16.1
CONTROL group	.88	8.11	40.8	38.0	12.2
Difference divided by the standard error of the difference	.04	3.0	2.35	1.2	2.3

The only statistically true difference in the scholastic marks of the second semester is the difference in percentage of 'B' marks in favor of the TRAINING group. The CONTROL group, however, made fewer 'F' marks and more 'C' marks than did the TRAINING group. The average quality points per hour was .36 for the TRAINING and .4 for the CONTROL group. These averages are approximately half of the average quality point value of work permitting the students to graduate from the College.

The fourth semester found the number of students in the two groups reduced to 41 in the Training group and 39 in the CONTROL group. The average on the Thorndike Intelligence Examination remained approximately the same as in the third semester groups. The scholastic marks shown in Table IV indicate improvement in the quality of work.

TABLE IV

Fourth Semester Percentages of Credit Hours Graded with the Various Class Marks

Class Marks	A	B	C	D	F
TRAINING groups	3.18	13.6	45.0	29.0	9.12
CONTROL group	1.5	21.7	42.8	29.0	5.02
Difference divided by the standard error of the difference	2.1	3.5	.74	0	2.26

The only statistically true difference between the groups in the fourth semester scholastic marks was in 'B' marks in favor of the CONTROL group. The differences in 'A' marks in favor of the TRAINING group and 'F' marks against the TRAINING group are approximately equal but not quite great enough to be called statistically true differences. Quality point averages for the fourth semester were .7 and .8 for the TRAINING and CONTROL groups respectively. These averages approximate the minimum requirement for work permitting graduation from the College. Thirty-four per cent of the TRAINING group and 26 per cent of the CONTROL group made an average of one quality point per hour (a 'C' average) during their respective fourth semesters in the College.

There were a few students in both groups whose Thorndike Intelligence Examination score was 70 or above. The scholastic marks of these students was approximately a 'C' average for those in the TRAINING group beginning with their *second* semester and a similar average for that corresponding division of the CONTROL group beginning with their *third* semester.

A graphic illustration of the scholastic progress of the total groups is shown in Figure 1.

The comparative data presented in this paper show at least a partial picture of the adjustment of the college probation group with and without special help. Since we were dealing with the students who made the lowest scholastic record in their class it seems highly probable that there were some students in the group who would not succeed in academic work if all possible means of assistance were available. Considering the fact that the average score on the Thorndike Intelligence Examination was some 12 points below the average of the total class it seems probable that some of these students were educationally out of place. It is probably significant that as a group the freshmen probation students do

not, within their first two years, attain the scholastic standing of the average college student.

It is of course impossible to know positively that the remedial work with the TRAINING group caused them to reach their level of performance one semester earlier than did the CONTROL group. The evidence, however, points toward that conclusion.

The fact that the TRAINING group failed more hours in the third and fourth semesters than did the CONTROL group is probably significant. Knowing the individuals

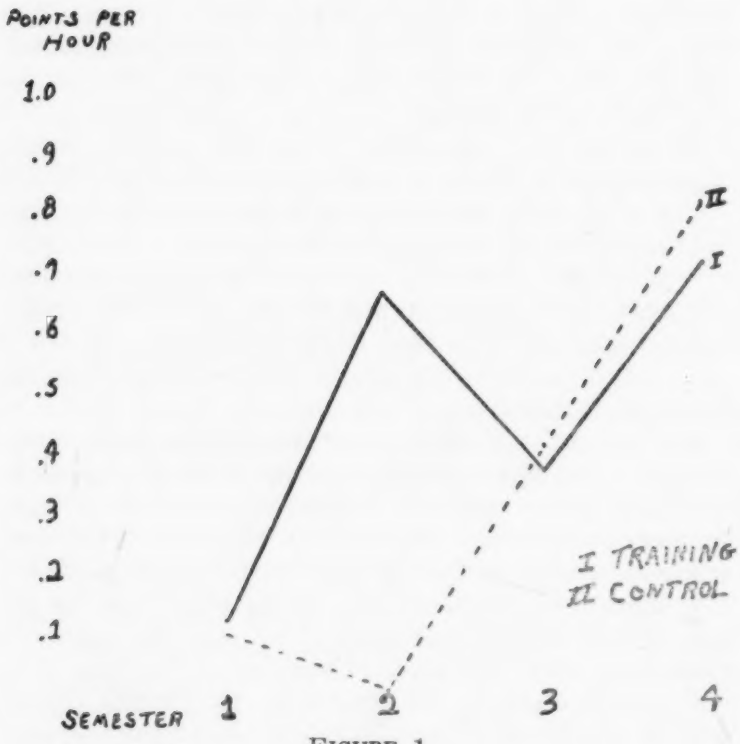

FIGURE 1

Curve showing the average quality points per credit hour for each group at the end of each semester

in the TRAINING group the writer suspects that some of the students learned to depend on help and when that help was discontinued they did more poorly than they might have done had they never been given help. This particular suspicion is substantiated by the records of the students in the TRAINING group who scored very low on the Thorndike Intelligence Examination. This type of student profits to some extent by assistance but even with that help he stands in continual danger of failure. On the other hand the more capable student profits by assistance in such a way that he is able to reach a satisfactory college adjustment which does not depend on continued help. We feel assured that remedial work is profitable for the student who is capable of maintaining the level of performance which he reaches by that help but we believe that the law of diminishing returns begins to operate when the student is not capable of carrying on without help after a semester of supervision of his study habits.

It is our hope that some of the efforts spent in attempting to help these students will bring about better mental hygiene even though the third and fourth semester scholastic averages seem not improved over what they might have been without our efforts.

The writer feels justified in assuming that probation students who remain in college consecutive semesters will eventually make a fair adjustment without assistance. It seems reasonable to suppose, however, that the earlier the adjustment can be made, the better for all concerned. Assistance in making college adjustments should be given as early as possible in the student's college career. The next step in our program which is in progress at the present time is an attempt to anticipate poor scholastic work and to help the student meet his problems as they arise.

Summary and Conclusions

1. The TRAINING group made statistically significant improvement above the average of the CONTROL group in the semester when the training was given.
2. The CONTROL group made a much lower scholastic average in their second semester than they did in their first semester.
3. The TRAINING group failed more hours than did the CONTROL group in their respective third and fourth semesters.
4. At the end of the fourth semester neither group as a whole had quite reached the scholastic standard of the average college student.
5. The students in the TRAINING group who had the higher intelligence test scores maintained their second semester scholastic level longer than did those students whose intelligence test scores were low.
6. Although the data in this study are too limited to use as a basis for generalization it seems probable that the probation student who is capable of profiting by assistance will reach his level of academic performance more quickly with assistance than he would through his own efforts.

[1] Each credit hour of 'A' grade merits 3 quality points, each hour of 'B' 2 points, and each hour of 'C' 1 point. No quality points are given for 'D' work and for each hour of work failed 2 quality points are subtracted from the student's record.

AN EXPERIMENT WITH COLORED AND UNCOLORED ADVERTISEMENTS

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The various attempts of the advertiser to attract and hold the attention of Mr. General Public form a very interesting group of studies for the psychologist. The advertiser is also interested in knowing some of the facts of psychology. The radio, magazine, newspaper, bill board, show window and numerous other devices are used to attract attention and cause sufficient desire on the part of the reader to make him purchase the desired articles. Millions of dollars are spent annually in the attempt to accomplish this feat. Still on every hand we hear the slogan, "Advertising Pays." The maker or salesman of an article which is in any way subject to competition must keep constantly on the alert or suffer considerable loss to his competitor who keeps the public reminded of his commodity.

Many companies which use the magazine as a medium of advertising are resorting to color to attract the attention of the reader. Colored advertisements cost more than uncolored ones. The question before the advertiser then is: Does this additional cost pay? Do colored advertisements have a greater attracting and holding power sufficient to warrant the extra expense?

In an attempt to answer the above questions the following experiment was performed with thirty-six college students as the subjects. These persons were shown twenty-eight full page advertisements selected from the McCall's Magazine. Fourteen of these advertisements

were pictures in color and fourteen were uncolored pictures. All of them were advertising articles with which the students were very likely to be equally familiar. Each advertisement was exposed for a period of ten seconds. This is probably as long a time as the uninterested reader would look at the advertisements in casually glancing through the magazine. The students were not told in the beginning the purpose of the experiment. Each student was told to look at each advertisement carefully and to observe what sort of an impression it made upon him. As each advertisement was exposed the students were given the name of the article which it advertised. Following is a list of the advertisements used in the order in which they were exposed:

Elgin Watch (uncolored)
General Electric Refrigerator (colored)
Swift's Premium Hams and Bacon (colored)
Grape Nuts (uncolored)
Chase and Sanborn's Coffee (uncolored)
Pepsodent Tooth Paste (uncolored)
P and G Soap (colored)
Fleischman's Yeast (uncolored)
Del Monte Canned Goods (colored)
Premier Electric Cleaner (uncolored)
Ford Motor Cars (colored)
Lux Soap Flakes (uncolored)
Postum (colored)
Kleenex Cleansing Tissues (uncolored)
Quaker Oats (uncolored)
Mazda Lamps (colored)
Johnson Furniture Wax (colored)
Snowdrift (colored)
Simmons Beds (uncolored)
Larvex Moth Killer (uncolored)
Shredded Wheat (colored)
Ovaltine (uncolored)

William Rogers & Son Silverware (colored)
Arm and Hammer Baking Soda (uncolored)
Congoleum (colored)
Maxwell House Coffee (colored)
Seventeen Beauty Preparations (uncolored)
Hudson-Essex Motor Cars (colored)

As soon as the last advertisement was shown the students were told to write the names of all of the articles which they could remember. The number of colored and uncolored advertisements which each student remembered is shown in the following table. In spite of the fact that the students were told to be definite nearly all of them listed some things in general terms, such as vacuum cleaner. These are listed in the table but are not counted in the advertisements remembered.

Table Showing Number of Colored and Uncolored Advertisements Remembered by Each Student

Student	Colored	Uncolored	Incomplete or indefinite expressions
1	6	6	Ivory soap, Elgin yeast.
2	6	2	Silverware, Floor wax, Cereal, Asparagus, Vacuum Cleaners.
3	7	7	Vacuum cleaner, Armour hams, Coffee, Yeast, Frigidaire.
4	5	6	Karo, Vacuum cleaner.
5	7	3	Carpet sweeper, Beauty preparation.
6	5	6	Karo, Carpet sweeper.
7	6	2	Aunt Jemima pancake flour, Vacuum cleaner.
8	7	7	
9	7	3	Swift lard, Electric cleaner, Grape fruit, Floor polish.
10	4	2	Grape fruit, Coffee, Electric appliances, Bedding-Restwell (?)
11	7	4	Frigidaire, Moth killer, Vacuum cleaner, Furniture wax, Breakfast food.
12	11	6	Suction sweeper, Coffee, Yeast.
13	11	4	Soda, Beds.
14	5	1	Watches, Beauty products, Alladin lamps, Hams, Nuts, Furniture.

Table Showing Number of Colored and Uncolored Advertisements Remembered by Each Student (continued)

Student	Colored	Uncolored	Incomplete or indefinite expressions
15	5	5	Tooth paste, General Electric, Electric cleaners, Moth killer fluid, Ham.
16	7	1	Peaches, Bananas, Ham, Electric cleaner, Floor varnish, Dental cream.
17	9	7	Floor cleaners (Eureka?)
18	8	4	Light bulb, Silver.
19	6	4	Madison electric lamps.
20	5	2	Swiss bacon, Tooth paste, Silverware.
21	8	4	Coffee, Canned goods, Floor polish, Electric cleaner, Baking soda.
22	5	5	Silverware, Floor paint, Soda.
23	6	1	Electric rug cleaner, Light.
24	8	7	Swiss hams, Refrigerators, Mattress, Armor baking soda.
25	7	3	Frigidaire, Furniture paints, Soda, Watches, Doctor reading a book, Hams.
26	8	5	Floor wax.
27	7	6	Armour's.
28	6	2	Listerine tooth paste, Swift's shortening, Canned goods, Electric refrigerators, Beds, Floor wax or polish, Some other coffee besides Maxwell House.
29	5	0	Coffee, Tooth paste, Electric cleaner, Watches, Beds, Silverware.
30	3	4	Armour's bacon and hams, Crisco.
31	1	2	Armour's ham.
32	9	7	Ham, Bananas, Electric floor sweeper.
33	4	0	Beds, Rugs, Powder, Coffee, Ham, Soda, Cleaner, Tooth paste, Fruits, Varnish, Soap, Silverware.
34	7	6	Silverware, Coffee.
35	4	2	Beauty rest mattresses, Floor wax, Malted milk, Ivory soap, Tooth paste, Baking soda, Flour, Mattresses.
36	11	6	Vacuum cleaner.
Total	233	142	

Careful observation of the table will reveal the following facts: Twenty-seven people remembered more colored advertisements than uncolored; five remembered the same number of each; and four remembered more uncolored advertisements. A total of two hundred thirty-three colored advertisements were recalled while only one hundred forty-two uncolored ones were recalled. This is an average of approximately 6.5 colored advertisements per student and 3.9 uncolored advertisements per student making an advantage of 66 per cent in favor of color. In an announcement issued by the McCall Company the following prices are found to be in effect at the time these advertisements appeared:

Black and White Page	$ 8,800.00
Two Color Page	9,500.00
Four Color Page	11,200.00

Some of the advertisements used in the experiment were two color and some were four color. Supposing the greatest extreme, that they were all four color, the additional expense is slightly less than 28 per cent more than for black and white advertisements. If by the expenditure of 28 per cent more money the advertiser might increase the attraction power of his advertisement by 66 per cent it would seem that the use of colored advertisements would pay.

We observe also in the table one hundred twenty-five incorrect or indefinite items named. Of these there are several which might be counted for purposes of this experiment, such as, "Vacuum cleaner," since the Premier was the only cleaner advertised in this group. (This, however, is not sufficient from the advertiser's standpoint.) Using all of these which could possibly be interpreted we find twenty-nine more colored advertisements which brings the total to two hundred sixty-two, and forty uncolored which brings that total to one

hundred eighty-two. From these figures we still find an average advantage of 44 per cent in favor of the colored advertisements.

Many advertisers prefer to use the same sort of advertisement continuously and probably by that means succeed in attracting and holding the attention of readers. This experiment, however, casts no light upon the effectiveness of that method.

THE RELATIONSHIP OF CERTAIN FACTORS TO SUCCESS IN CLERICAL POSITIONS

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In the course of an occupational analysis made to determine the duties of clerical positions, the writer had occasion to collect information from a considerable number of clerical workers under several headings, including the following:

Number of years of school training;
Number of years' experience in the present position;
Scores on the Otis Self-Administering Test of Mental Ability;
Scores on the Kinney Tests in Commercial Arithmetic, Scale A (addition, subtraction, multiplication and division).

In each of the establishments that were visited the office manager was asked to rate his workers in four categories, according to competence. Those giving average satisfaction were rated C, those rated D were below the average, while those rated B and A were superior workers, with A more superior than B. Data were collected in most of the establishments from workers who had received a rating of B or A.

When the data were collected from the main office of a wholesale house and from the credit office of a mail order house, the tests were given at the requests of the respective office managers to all the clerical workers in each office. This offers an opportunity for comparing the data from the groups of different abilities, making possible a study of the extent to which each of several factors contributes to success in a clerical position.

A study of the data showed that the male clerical workers differed as a group from the female workers with regard to the various factors. Consequently only the female clerical workers were included in the groups to be compared. In the mail order house there were 54 and in the wholesale office there were 77 female clerical works regarding whom data were obtained. These were distributed according to type of position and rating as follows:

TABLE I

The Number of Clerical Workers of Each Type Who Were Given Each Rating

	Mail Order					Wholesale				
	A	B	C	D	Total	A	B	C	D	Total
Manual Bookkeeper	1		2		3	1	1			2
Machine Bookkeeper					0	1	2			3
Stenographer	2	2			4	3	8	1		12
Typist	2	4	2		8	5	8	11	1	25
Comptometer Operator	1			1	2	4	5	3		12
General Clerical	6	7	18	6	37	5	7	9	2	23
Totals	12	13	22	7	54	19	31	24	3	77

Before proceeding to a comparison of the different groups within each of the offices it is of interest to compare the two office forces with one another. The means and standard deviations of the measures, together with the differences of the means, are:

	Wholesale		Mail Order		
	Mean	S.D.	Mean	S.D.	Difference
Years of school	11.1	2.9	11.1	2.0	0.0
Years of experience	3.8	3.7	1.8	1.6	2.0± .68
Otis test scores	45.4	11.6	43.3	11.7	2.1±1.21
Addition scores	51.5	11.2	52.2	12.1	0.7±1.41
Subtraction scores	51.0	11.4	54.9	11.5	3.9±1.37
Multiplication scores	51.5	11.1	49.7	12.0	1.8±1.39
Division scores	49.3	7.6	45.7	8.7	3.6±1.00

Most of the differences are rather small as compared to their probable errors. It will be noted, however, that the average time during which the clerical worker has been in his position is two years greater in the wholesale house than in the mail order house. Furthermore, the mean score on the Otis test is slightly higher in the wholesale house than in the mail order house while the workers in the mail order house were somewhat superior in addition and subtraction, but being inferior in division.

Two questions that may be considered when the groups of workers of various abilities are compared with one another may be stated as follows:

1. In what respects and to what extent does a group composed of average and inferior workers (categories C and D) differ from a superior group (categories A and B)?
2. What is the relationship between success as measured by the rating of the office manager and the various factors on which data were collected?

Information on the first question may be secured by a group comparison, using the difference of the means as well as a biserial correlation. For the second question the product-moment correlation is used between the measures of the factors and success in the position as measured by the rating of office managers. The data for each office are considered separately, since the ratings for the two offices were not made by the same person.

A general consideration of errors in measurement leads to the conclusion that the values found in these ways will represent minimum rather than typical values for the relationships. Among these errors is an evident tendency on the part of the office managers in assigning a rating to be influenced by the type of position held by the clerical worker. This tendency can be noted in Table I. It is apparent that the bookkeepers are more

apt to receive a high rating than a low one, while the general clerical worker is more apt to get a C rating. A numerical expression for the amount of this tendency is obtained through the coefficient of contingency. These are: for the mail order house, .416 and for the wholesale house, .381.

A further condition that probably diminishes the apparent difference between the superior group and the average and inferior group is the tendency for the clerical workers in each type of clerical position to resemble one another and to differ from workers of the other types with respect to the factors that are being considered. By means of the coefficient of contingency an expression of the degree of association of each of the factors with the types of clerical position may be obtained. These coefficients are as follows:

	Wholesale	Mail Order
Years of school	.656	.660
Years of experience	.721	.612
Otis test scores	.673	.679
Addition scores	.581	.703
Subtraction scores	.551	.654
Multiplication scores	.617	.682
Division scores	.407	.704

Further errors of measurement, such as the unreliability of the measuring instruments, doubtless exist but no quantitative statement of them will be attempted.

In Table II a comparison is made of two groups of clerical workers in each office, the superior group consisting of the workers in the A and B categories and the inferior group consisting of clerical workers in the C and D categories. The means of the two groups and the difference between the means are as shown.

TABLE II

The Means and Differences of the Means of the Superior and Inferior Groups of Clerical Workers

MAIL ORDER OFFICE

	Means			
	S.	I.	Difference	P.E.
Years of school	11.5	10.7	.8	.37
Years of experience	2.1	1.4	.7	.38
Otis test scores	45.0	42.0	3.0	2.13
Addition scores	59.0	46.3	12.7	2.00
Subtraction scores	61.9	48.9	13.0	1.72
Multiplication scores	57.5	43.0	14.5	1.71
Division scores	49.1	42.7	6.4	1.55

WHOLESALE HOUSE

	Means			
	S.	I.	Difference	P.E.
Years of school	11.3	10.9	.4	.75
Years of experience	4.4	2.5	1.9	.57
Otis test scores	46.6	43.0	3.6	1.73
Addition scores	52.8	48.8	4.0	1.36
Subtraction scores	51.3	50.0	1.3	1.80
Multiplication scores	52.6	47.8	4.8	1.53
Division scores	49.8	48.1	1.7	1.23

An outstanding fact to be noted from the table is that the differences are all in favor of the superior groups in both offices. In several of the measures the differences are small but in the fundamental operations in arithmetic the superior group in the mail order house is significantly higher in its mean score than is the inferior group. In the wholesale office there is a difference of nearly two years between the means of the two groups in years of experience. The differences in multiplication and addition, while not so great, are equal to nearly half of the standard deviation on the distribution as a whole.

In Table III are given the biserial coefficients of correlation between the various factors and the grouping of the clerical workers into superior and inferior groups. As would be expected from the nature of the coefficient,

the trend of the relationships is similar to that indicated by the differences of the means.

TABLE III

The Biserial Coefficients of Correlation Between the Various Factors and the Grouping of the Clerical Workers

	Mail Order Office	Wholesale Office
Years of school	.259±.109	.066±.152
Years of experience	.272±.109	.470±.131
Otis test scores	.165±.113	.189±.144
Addition scores	.627±.077	.211±.142
Subtraction scores	.710±.069	.068±.153
Multiplication scores	.757±.063	.260±.141
Division scores	.461±.096	.134±.145

For the purpose of obtaining the product-moment correlation of the measurements with the ratings in the four categories, it was necessary to convert the qualitative ratings of the office managers, as given in Table I, into quantitative ratings. This was done by assuming a normal distribution of ability in each office and finding the means of the categories. The numbers thus found were substituted for the letter ratings provided by the office managers.

The correlations of the factors with these ratings are shown in Table IV.

TABLE IV

Correlation Between Various Factors and Ratings of Office Managers

	Mail Order Office	Wholesale Office
Years of school	.118±.090	.144±.076
Years of experience	.246±.086	.155±.176
Otis test scores	.155±.091	.307±.073
Addition scores	.653±.063	.220±.075
Subtraction scores	.375±.079	.248±.074
Multiplication scores	.388±.078	.383±.070
Division scores	.361±.082	.226±.075

If it is assumed that success in the position is adequately measured by the rating of the office manager, the following conclusions regarding the mail order house appear to be supported by the correlations:

1. Ability in addition as measured by the tests correlates with success to a fairly high degree.
2. Ability in subtraction, multiplication and division as measured by the tests and also the years of experience all have a low positive correlation with success.
3. Years of school training and intelligence as measured by the Otis test have little relation to success.

The absence of a close relationship between school training and success may be explained partially by differences in standards and types of training among the schools as well as by the narrowness of the distribution for school training. The mean is eleven years and one month of school training, with a standard deviation of only two years. It is easy to believe that additional years of training beyond the mean might make little difference in the probability of success in the position except insofar as it implies the mental capacity to do the more advanced school work.

It is more difficult to account for the lack of any significant relationship between intelligence and success. There is a rather wide range of intelligence, since the standard deviation of the distribution of scores is 11.6 points on the Otis test. It is hard to believe that within this range there is little or no tendency for those with higher mental ability to do more satisfactory work. On the other hand the biserial correlations and the difference of the means (Tables III and II) point in the same direction, unless the influence of intelligence on success has been lost as a result of the errors of measurement previously discussed.

In the wholesale office the relationship of school training and of experience to success is small and unreliable.

The relationships of the other factors to success are also low but are more reliable.

On comparing the relationships as shown in Tables II and III with those shown in Table IV, it appears that such factors as have been measured may contribute to success in two ways. One type of factor is critical in determining whether the worker is to be classified in the inferior or superior group, but is of less significance in influencing the classification in the finer categories. Such a factor will show a significant biserial correlation with success, but a low, possibly insignificant correlation in the four categories. An illustration of such a factor is experience in the wholesale house.

Another type is that which is of itself not sufficient to cause the worker to be classified as superior or inferior but which in addition to other factors may be of importance in determining whether a worker is distinctly superior. Such a factor will be expected to have a low biserial correlation with success but a more significant correlation with success in the four categories. An illustration of this type of factor is intelligence test scores in the wholesale house.

Probably the most significant outcome of the study is the fact that in spite of the numerous errors of measurement, each of which might be expected to reduce the differences betwen the groups that are being compared, positive relationships are found between each of the factors and success in the position. While many of the differences and correlations were small, all of them were in the same direction. The probability that any of them were due to chance is, therefore, very small.

THE FEELING TONE OF ADJECTIVES

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Although the method of this experiment may be applied in broader fields this article will concern itself specifically with the work of Poffenberger and Barrows (2) on the feeling tone of lines and curves. It may be well to describe briefly their method and conclusions. Five hundred subjects were given two sheets of paper, one containing a set of eighteen lines and curves and the other containing 47 adjectives arranged in thirteen classes of feeling (see Table I). The subjects were instructed to "Begin with Class I of the feelings and find that line on the chart that best expresses to you the feelings that Class I represents. Do the same for each of the thirteen classes of feeling. You may use the same line as often as you wish." A table of percentages for the subjects' judgments was worked out on this basis.

In some cases the percentages were high enough to make definite conclusions justifiable and it was brought out strikingly that by the consensus of opinion the angular, abrupt lines represented power, fury, and the allied emotions, and the curved lines were sad, quiet, lazy, gentle, merry, or playful. This was definitely established but among figures in the same general emotional bracket the differentiation was less clear. The table of percentages bears out this confusion.

Where confusion exists one of two factors is probably responsible: (1) the figure may be ambiguous; (2) overlapping or confusion may exist between two or more groups in the list of adjectives. An investigation of the

tables seems to lead to the conclusion that the overlapping is due mainly to figure ambiguity—the lines and curves probably feeling tone in only a broad sense—but in some cases the groups of adjectives may very well be held accountable.

It was the object of this experiment to investigate just how well the groups of adjectives were chosen[1] to determine how much overlapping occurs between the groups and to present a revised list based on group judgments.

PROCEDURE

Tests were given to 50 subjects all of whom were college students or college graduates. The test contained two lists, List A being composed of the thirteen key-words of Poffenberger and Barrows, and List B being composed of 120 other words presented in alphabetical order. List B was compiled by the experimenter. For each List A word ten words, the majority from the dictionary and thesaurus, were selected for List B, including all the other words of Poffenberger and Barrows. The subjects thus had a wide selection from which to choose.[2] The subjects were instructed to indicate "For each word in List A the five words of List B most closely related in feeling tone or emotional quality to it." The five chosen words were to be ranked in order of preference. The subjects were given no other instructions but those appearing on the test blank. In order to test the appropriateness of the thirteen key-words, the subjects were instructed to underline that one of the six words in each group (composed of the List A word and

[1] The Poffenberger-Barrows list was adopted from a previous list worked out by Lundholm (1).

[2] Due to a certain amount of unavoidable overlapping, ten of the List B words might be used for either of various pairs of List A words.

the five choices) which he judged most representative of the emotional quality of the group.

RESULTS

The results showed that individual differences were considerable. The greatest differences occurred in Group VI, Furious, (see Table I) with 36 different words chosen from List B, and Group II, Quiet, with 35 words. The words Sad with 22, Merry with 23, and Playful with 23, showed the smallest scattering of choices. Yet there was sufficient concentration of opinion to allow five choices to stand out for each word. It was found that when each first choice was given five points, each second choice four, and so on, the weighted scores correlated closely with the raw scores. In a computation worked out for one of the groups the correlation was .92. The raw scores were therefore used except in cases of ties and very close scores.

The choices which appear in Table I show a high correspondence with the Poffenberger-Barrows list. Three new key-words were substituted, however: Tranquil for Quiet in Group II, Indolent for Lazy in Group III, and Lifeless for Dead in Group VII. Lazy and Dead have "torpid" emotionally synonymous in the highest five choices. While the Poffenberger-Barrows list contains a varying number of feeling-tone associates for the different key-words, the revised list is uniform in this respect.

The overlapping, however, needs to be investigated further than by comparing the highest five choices. As an example of overlapping between two groups, the complete list of words in common between Agitating and Playful (selected because they are ostensibly unrelated) is "lively, active, animated, vigorous, rollicking, sparkling." Table II presents the cases where the overlapping is greater than 25 per cent. The 70 per cent figure for

TABLE I

	THE POFFENBERGER-BARROWS LIST		THE REVISED LIST
I.	*sad*, melancholy, mournful, doleful, sorrowful.	I.	*sad*, melancholy, mournful, unhappy, dejected, gloomy.
II.	*quiet*, calm, tranquil, serene.	II.	*tranquil*, quiet, still, peaceful, calm, restful.
III.	*lazy*, indolent, idle.	III.	*indolent*, lazy, slothful, sluggish, torpid, listless.
IV.	*merry*, cheerful, gay, jolly, joyous.	IV.	*merry*, gay, jolly, blithesome, joyful, mirthful.
V.	*agitating*, exciting, fiery, brisk, vivacious, lively.	V.	*agitating*, disturbing, exciting, startling, turbulent, tempestuous.
VI.	*furious*, angry, cross, vexed, enraged.	VI.	*furious*, enraged, wrathful, raging, angry, incensed.
VII.	*dead*, dull.	VII.	*lifeless*, dead, inert, spiritless, dormant, torpid.
VIII.	*playful*.	VIII.	*playful*, frisky, frolicsome, sportive, rollicking, lively.
IX.	*weak*, feeble, faint, delicate.	IX.	*weak*, frail, feeble, delicate, faint, fragile.
X.	*gentle*, mild.	X.	*gentle*, tender, docile, mild, kind, soft.
XI.	*harsh*, hard, cruel.	XI.	*harsh*, severe, cruel, hard, stern, sharp.
XII.	*serious*, solemn, grave, earnest.	XII.	*serious*, grave, solemn, sober, earnest, sedate.
XIII.	*powerful*, forceful, strong.	XIII.	*powerful*, strong, mighty, forceful, vigorous, impressive.

Groups IV-VIII indicates that the two separate classifications of feeling tone should probably be combined for a standardized list.

TABLE II

Cases of Overlapping Greater than 25%

Groups	Key-Words	Per Cent of Overlapping
IV-VIII	merry-playful	70
VII-VI	agitating-furious	47
VI-XI	furious-harsh	39
XI-XIII	harsh-powerful	36
I-VII	sad-dead	35
VI-XIII	furious-powerful	29
III-IX	lazy-weak	28
II-X	quiet-gentle	26
XII-XIII	serious-powerful	26

A certain amount of overlapping is obviously unavoidable, but it is as obviously desirable, not only to cut this overlapping to a minimum, but to know just how important a factor it is in each case. The above analysis in terms of percentages is an attempt to fill the latter need.

CONCLUSIONS

The present experiment shows that there is considerable difference between a dictionary synonym and a feeling-tone associate. The great divergence of choices substantiates this. Large as the individual differences are, there is generally sufficient concentration to permit of a fairly standard list of adjectives. This list together with data on overlapping may be useful for experimentation similar to the work of Poffenberger and Barrows on feeling tone.

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FURTHER STANDARDIZATION OF THE ELLIS MEMORY FOR OBJECTS TEST

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The Ellis Memory for Objects Test consists of ten one-inch metal toy objects:—a hat, car, dog, shoe, rider, gun, chair, axe, cup and hen. The child names the objects as they are presented to him one at a time. He names them again, noting the exact order. Then the objects are removed and he tells which object came first, second and so on. Ten points are given for each object named, but one point is deducted for each place the object is removed from the correct position.

The purpose of this study was to standardize the memory test for years five to eight. It had previously been standardized for years nine to thirteen. The directions for giving the test as stated by Bronner in her Manual of Individual Mental Tests and Testing were followed.

There were 360 public school children in New York City included in this study. The Ellis Memory for Objects Test was given to them at the same time as the Stanford Binet Intelligence Examination. As nearly all of these children were retarded in mental development, their mental ages rather than their chronological ages were used in the standardization of the test.

In the previous standardization there were fifty boys and fifty girls in each age group. The same number was used in this study with the exception of the five year group where only thirty boys and thirty girls were available.

For the sake of uniformity the data gathered in this study are presented in the same way as that in the previous standardization. The norms in the following table include the results of both studies.

The fact seems worthy of note that in both of these independent studies there is a gradual increase in score as the children become older and a slightly better record on the part of the girls.

NORMS FOR ELLIS MEMORY FOR OBJECTS TEST

Age	*Average Score*		*Standard Deviation*	
Years	*Boys*	*Girls*	*Boys*	*Girls*
5	51	52	10.8	14.2
6	60	60	15.5	12.6
7	64	63	12.4	15.5
8	66	68	12.0	11.5
9	68	72	12.0	11.6
10	73	74	10.3	13.4
11	74	75	13.2	10.2
12	71	78	9.9	11.2
13	72	77	11.3	12.4

THE STANDARD ERROR OF THE AVERAGE INTERCORRELATION AND OF THE AVERAGE CRITERION CORRELATION

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In many problems, such as the standardizing of a quality scale, the combination of subjective ratings or the construction of a battery of tests of a single function, it is important to know the average intercorrelation of a considerable number of measures. This may be obtained by computing all the intercorrelations and averaging the several values, or by employing a shorter formula derived by Edgerton and Toops.[1] If the original data are all given in terms of ranks, a still shorter method devised by Kelley[2] may be used.

The usefulness of any statistical formula is greatly increased when its standard error is known. The derivation of the standard error of the average intercorrelation is straightforward, but the formula when derived is entirely too lengthy for practical computation. Furthermore, it involves all the individual intercorrelations, thus nullifying the value of the shorter formulas for the average intercorrelation. But if all the intercorrelations may be assumed to lie substantially within the range of values from 0.0 to 0.7 or from 0.0 to —0.7, forming a fairly homogeneous group most of which are of like sign and not too high, then it may be reasonable to resort to an approximation in which the value of the average intercorrelation coefficient is substituted for that of each separate intercorrelation in turn. Many systems of in-

tercorrelations, including those mentioned in the previous paragraph, are essentially of this type.

Let n measurements be recorded for each of N individuals. If we designate the average intercorrelation R, any individual intercorrelation r_{ij}, and the total number of intercorrelations, which is $n(n-1)/2$, n', we have,

$$R = \frac{1}{n'} \sum_{1}^{n'} r_{ij}. \tag{1}$$

If we consider the coefficients in pairs, there will appear two types, those which have one variable in common (r_{ij}, r_{ik}), and those with no common variable (r_{ij}, r_{kq}). Of the first type, for any given i there will be $(n-1)(n-2)/2$ combinations of j and k, so that there will be $n(n-1)(n-2)/2$ pairs of this type. We shall call this number n''. Furthermore, there will be $n'(n'-1)/2$ pairs of coefficients altogether. Rewriting this in terms of n and subtracting n'', we find that there are $(n+1)n(n-1)(n-2)/8 - n''$ pairs of the second type. We shall designate this number n'''.

Now rewriting equation (1),

$$R = \frac{1}{n'}\left[r_{12} + r_{13} + \ldots + r_{1n} + \ldots + r_{(n-1)n} \right].$$

Differentiating,

$$dR = \frac{1}{n'}\left[dr_{12} + dr_{13} + \ldots + dr_{1n} + \ldots + dr_{(n-1)n} \right].$$

Squaring, summing for all samples, and dividing by the number of samples in the universe,

$$\sigma_R^2 = \frac{1}{n'^2}\Big[\sigma^2 r_{12} + \sigma^2 r_{13} + \ldots + \sigma^2 r_{(n-1)n} + 2P r_{12} r_{13} + \ldots$$
$$\ldots + 2P r_{(n-1)(n-1)} r_{(n-1)n} \Big].$$

The symbol P represents a sampling product-moment coefficient. Thus $Pr_{12}r_{13}=\sigma r_{12}\sigma r_{13}r_{r_{12}r_{13}}$. Then finally,

$$\sigma_R=\frac{1}{n'}\left[\sum_1^{n'}\sigma^2 r_{ij}+2\sum_1^{n''}Pr_{ij}\,r_{ik}+2\sum_1^{n'''}Pr_{ij}\,r_{kq}\right]^{\frac{1}{2}}. \quad (2)$$

This is the required formula. The values of $\sigma^2 r_{ij}$, $Pr_{ij}\,r_{ik}$, and $Pr_{ij}\,r_{kq}$ are well known. Kelley[3] has given them in a form suitable for present purposes. We have in succession,

$$\sigma^2 r_{ij}=\frac{1}{N}(1-r^2_{ij})^2. \quad (3)$$

$$Pr_{ij}\,r_{ik}=\frac{1}{N}\left[\left(\frac{1}{2}r_{ij}r_{ik}\right)(r^2_{ij}+r^2_{ik}+r^2_{jk}-1)+r_{jk}(1-r^2_{ij}-r^2_{ik})\right]. \quad (4)$$

$$Pr_{ij}\,r_{kq}=\frac{1}{N}\Big[r_{ik}r_{jq}+r_{iq}r_{jk}-(r_{ij}r_{ik}r_{iq}+r_{ij}r_{jk}r_{jq}+r_{ik}r_{jk}r_{kq}+r_{iq}r_{jq}r_{kq})+\frac{1}{2}r_{ij}r_{kq}(r^2_{ik}+r^2_{iq}+r^2_{jk}+r^2_{jq})\Big]. \quad (5)$$

Replacing all the varying values of r_{ij}, r_{ik}, r_{iq}, r_{jk}, r_{jq}, and r_{kq} by R in (3), (4), and (5), simplifying, and substituting in (2), we obtain,

$$\sigma_R=\frac{1}{n'\sqrt{N}}\left[n'(1-R^2)^2+n''R(3R^2-4R^2-R+2)+4n'''R^2(R-1)^2\right]^{\frac{1}{2}}. \quad (6)$$

Substituting for n', n'', and n''', their values in terms of n, we have finally,

$$\sigma_R=\frac{1}{\sqrt{N}}\left[(1-R^2)^2+(n-2)R(3R^3-4R^2-R+2)+(n-2)(n-3)R^2(R-1)^2\right]^{\frac{1}{2}}. \quad (7)$$

This formula may be used to obtain the standard error of either the Edgerton-Toops or the Kelley formula for the average intercorrelation, to a first approximation. The Edgerton-Toops formula may be written,

$$R = \frac{1}{Nn(n-1)}\left\{\Sigma\left[S\left(\frac{X}{\sigma}\right)\right]^2 - N\left[S\left(\frac{M}{\sigma}\right)\right]^2\right\} - \frac{1}{n-1}. \quad (8)$$

In this formula, X represents a gross score, and M and σ are the mean and standard deviation respectively of the N values of one variable. Σ is a summation from 1 to N, and S is a summation from 1 to n, the number of variables. Kelley's formula may be written,

$$R = 1 - \frac{n(4N+2)}{(n-1)(N-1)} + \frac{12\Sigma s^2}{n(n-1)N(N^2-1)}. \quad (9)$$

The value s is the sum of the n ranks of a single individual, and Σ is a summation from 1 to N, the number of individuals, as before.

In computing R by formula (8), it is necessary to compute M, σ, $1/\sigma$ and M/σ for each variable. X/σ is then computed for each of the nN observations, and $[S(X/\sigma)]^2$ is calculated for each of the N subjects. These results may now be substituted in formula (8). Edgerton and Toops[1] have devised a method for performing all operations rapidly on a calculating machine, and checking them. The computation of R by formula (9) should be evident.

The average correlation between one variable and several others is often important. This average criterion correlation may be used to determine the accuracy of subjective judgments by correlating them with an objective criterion, or conversely to investigate the validity of a test by comparing it with several independent judgments.

If we have one criterion measurement, X_0, and n additional measurements, X_1, X_2, . . . X_n, for each of N subjects; we may define R', the average criterion correlation, by the equation,

$$R' = \frac{1}{n}(r_{01}+r_{02}+ \ldots +r_{0n}). \tag{10}$$

Differentiating, squaring, summing for all samples, and dividing by the number of samples,

$$\sigma^2_{R'} = \frac{1}{n^2}(\sigma^2 r_{01}+ \ldots +\sigma^2 r_{0n}+2Pr_{01}r_{02}+ \ldots +2Pr_{0(n-1)}r_{0n}). \tag{11}$$

There will be n terms of the form $\sigma^2 r_{0i}$ and $n(n-1)/2$ of the form $2Pr_{0i}r_{0j}$. If nearly all the criterion correlations are of the same sign and not too high, and if the intercorrelations among the variables other than the criterion also form a relatively homogeneous system, we may again resort to approximations in evaluating (11). For all the values of $\sigma^2 r_{0i}$ we shall substitute the value of $\sigma^2_{R'}$, as given by formula (3). In the sampling product-moment coefficients there occur correlations of two types, r_{0i} and r_{ij}. For all those of the first type we shall substitute R', and for all those of the second, R, the average intercorrelation. Formula (4) then becomes,

$$Pr_{0i}r_{0j} = \frac{1}{N}\left[R'^4+\frac{1}{2}R'^2(R^2-4R-1)+R'\right]. \tag{12}$$

Substituting in (11) and simplifying,

$$\sigma_{R'} = \frac{1}{\sqrt{nN}}\left[(1-R'^2)^2+(n-1)\left(R'^4+\frac{1}{2}R'^2\{R^2-4R-1\}+R'\right)\right]^{\frac{1}{2}}. \tag{13}$$

Formula (13) gives the standard error of the average criterion correlation. To use this formula it is necessary to know the value of the average criterion correlation itself, and also the value of the average intercorrelation among the variables other than the criterion. This latter may be obtained from the Edgerton-Toops formula, or from Kelley's formula if the original data are given in terms of ranks. The average criterion correlation may be obtained, without computing the individual criterion correlations, from the formula,

$$R' = \frac{1}{nN\sigma_o}\left[\Sigma\left\{X_o S\left(\frac{X}{\sigma}\right)\right\}\right] - \frac{M_o}{n\sigma_o} S\left(\frac{M}{\sigma}\right). \qquad (14)$$

In this formula, Σ is a summation from 1 to N and S is a summation from 1 to n, as before. If the data are given in terms of ranks,

$$R' = 1 - \frac{6}{nN(N^2-1)}\left[n\Sigma x_o^2 - 2\Sigma x_o s + \Sigma S x^2\right]. \qquad (15)$$

Here, x_o is a criterion rank, x is any other rank, and s is the sum of the n ranks (other than the criterion rank) of any individual.

Formula (14) may be derived as follows:

From (10),

$$R' = \frac{1}{n}\left(\frac{\Sigma x_o x_1}{N\sigma_o\sigma_1} + \ldots + \frac{\Sigma x_o x_n}{N\sigma_o\sigma_n}\right)$$

$$= \frac{1}{nN\sigma_o}(\Sigma X_o X_1/\sigma_1 - NM_oM_1/\sigma_1 + \ldots + \Sigma X_o X_n/\sigma_n - NM_oM_n/\sigma_n).$$

Collecting first the Σ—terms and then the N—terms, we obtain (14). The only computations required in addi-

tion to those used in obtaining the average intercorrelation, are the ones concerned with getting M_o, σ_o, and the [ ]—factor. $S\left(\frac{X}{\sigma}\right)$ will have been obtained for each subject; these values are now multiplied by the values of X_o and the products (N in number) added. All the values needed for substitution in (14) will then be at hand.

In deriving formula (15), we note that from Spearman's well-known formula for rank-correlation, letting x_o be a criterion rank and x a rank in any other variable,

$$R' = \frac{1}{n}\left[1-\frac{6\Sigma(x_o-x_1)^2}{N^3-N}+\ \ldots\ +1-\frac{6\Sigma(x_o-x_n)^2}{N^3-N}\right]$$

$$= 1-\frac{6}{nN(N^2-1)}\left[\Sigma S(x_o-x)^2\right].$$

Now for any individual,

$$S(x_o-x)^2=(x_o-x_1)^2+\ \ldots\ +(x_o-x_n)^2$$
$$= x^2_o-2x_ox_1+x^2_1+\ \ldots\ +x^2_o-2x_ox_n+x^2_n$$
$$= nx^2_o-2x_oSx+Sx^2, \text{ and}$$
$$\Sigma S(x_o-x)^2 = n\Sigma x^2_o-2\Sigma(x_oSx)+\Sigma Sx^2$$
$$= n\Sigma x^2_o-2\Sigma x_o+\Sigma Sx^2,$$

where $s = Sx$ as in Kelley's formula for R. Substitution of this last expression in the formula for R' leads at once to (15).

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A CLASS EXPERIMENT IN THE TRANSFER OF TRAINING

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Some class experiments in the transfer of training are objectionable because they consume an excessive amount of time. Others are unsuitable because of their artificial nature. The following experiment is not time consuming since it utilizes training that students have had *prior* to entering college. Furthermore, since it is based upon student experience, it is likely to be meaningful to a group of undergraduates. A brief description of the experiment follows.

PREPARATION AND PROCEDURE

Part. I. The four following problems may either be written on the blackboard or they may be mimeographed and each student provided with a sheet of paper containing them.

1. $\dfrac{22 \times 12 + 5 \times 12 - 20 \times 12}{7 \times 12} = ?$

2. $\dfrac{20 \text{ times } 11 \text{ plus } 12 \text{ times } 11 \text{ minus } 30 \text{ times } 11}{11} = ?$

3. $16\,(14 \times 15) + 14\,(14 \times 15) - 29\,(14 \times 15) = ?$

4. $27^2 - 2 \times 27 \times 23 + 23^2 = ?$

The students, having been provided previously with pencil and paper, are now instructed as follows: "Solve

these four problems as rapidly as is consistent with accuracy. Raise your right hand as soon as you have finished solving all four of them."

Part. II. As soon as the students have started to solve the foregoing problems place problems (5) to (8) inclusive on the blackboard (or be prepared to present them to the students on a second mimeographed sheet).

5. $\frac{22x + 5x - 20x}{7x} = ?$

6. $\frac{20x + 12x - 30x}{x} = ?$

7. $16x + 14x - 29x = ?$

8. $a^2 - 2ab + b^2 = ?$
(If $a = 27$; and if $b = 23$)

When the students raise their hands to indicate that they have solved the first four problems they may be told to solve problems (5) to (8) inclusive.

To most college students it will be evident at once that problems (5), (6), and (7) may be solved easily by inspection, and most of the students will take advantage of this fact. It will not be so evident to most of them that problems (1) and (5) are quite similar in form, the only difference being that in problem (1) figure 12 corresponds to the symbol x in problem (5). Had the students perceived the possibility of applying algebraic methods in the solution of problem (1), they could (and doubtless would) have solved problem (1) also by inspection.

After the students have finished solving both sets of problems, the foregoing and the following facts may be pointed out to those who are still unaware thereof. Problems (2) and (6) are identical except that in problem (6) algebraic symbols are employed whereas in problem (2) the words for which these symbols stand are written out in full. Similarly, problems (3) and (7) are identical in form, e. g., in problem (7) the symbol x is equivalent to the term (14×15) which appears in problem (3).

Problems (4) and (8) are likewise identical and both may be solved speedily and easily by inspection. Thus, the algebraic expression $(a^2 - 2ab + b^2)$ is equal to $(a - b)(a - b)$. But when a equals 27 and b equals 23, the foregoing factors are equivalent to $(27 - 23)(27 - 23)$ which equals $(4)(4)$ or 16.

The writer has presented the two foregoing sets of problems (and other similar ones) to numerous college students. He has found that before the algebraic possibilities are pointed out to them, less than 10 per cent of his students have solved the first four of these problems by the use of algebraic methods.

In order that the data obtained by means of the foregoing procedure might be analyzed in greater detail, the first four of the above problems were mimeographed recently on a single sheet of paper and presented to 108 college students with instructions that the problems be solved. When all of the papers containing the first four problems had been handed in, the last four were presented similarly on a second mimeographed sheet. The findings are set forth in Table I. Column 2 of Table I reveals that less than 5 per cent of the college students employed algebraic methods in attacking problems (1) to (4) inclusive. And, although 96 per cent of the students employed their algebraic knowledge in the solution of problems (5), (6), and (7), only 9 per cent of them solved problem (8) by factoring.

Remarks

We are sometimes told that the study of mathematics has intrinsically peculiar values for improving the general power of reasoning. The foregoing experiment reveals that under the conditions of the experiment algebraic knowledge and skill may fail to function *when the student is confronted by relatively simple and obviously mathematical situations.* Since only 4 per cent* of the college students were able fully to utilize their mathematical knowledge when confronted by these simple arithmetic situations, is it reasonable to suppose that a *large* percentage of them would be able to apply their mathematical reasoning when confronted by *non-mathematical* situations? Certalnly, the present findings fail to validate the assertion that the study of mathematics has intrinsically peculiar values for improving *the general power of reasoning.*

All of the students who participated in this study knew certain arithmetic combinations. Ninety-six per cent of them were familiar also with simple algebraic procedures.** But these students had been trained evidently to employ algebraic procedures only in a formal, rule-of-thumb manner. When the cues x and y were present, as in problems (5) to (7) inclusive, algebraic methods were likely to be employed. But in the absence of these cues the possibility of employing algebraic methods seemed not to occur to most members of the group. Most of these students had never been taught that high school algebra is, among other things, a form of general-

* Personal interviews revealed that of the four students who solved the first two problems by inspection, two had received specific practice in applying algebraic methods to simple arithmetic problems of this type; the other two students stated that they had discovered for themselves the possibility of doing this.

** Of the students who were unable to solve problems (5), (6), and (7), two stated that they had never studied algebra; the other two stated that they had "forgotten" their algebra.

ized arithmetic. Therefore, in the vast majority of cases they were unaware of, and they failed to discover, the possibility of utilizing algebraic methods in the solution of problems (1) to (4) inclusive.

Rare indeed is the student (or the instructor) who is able to utilize his algebraic knowledge in all of the innumerable situations in which it would be advantageous to do so. Indeed, there are very definite limits to the economy that would be effected by attempts to do this; such attempts would often be a waste of time and of effort. The point that the writer would emphasize is the fact that students often are *totally unaware of the possibility of making such application.*

Since the purpose of this article is that of describing a brief class experiment, it will perhaps be well at this point to summarize its advantage. These are as follows:

1. The experiment may be employed in the ordinary lecture room, with large numbers of students and with little loss of time.

2. It utilizes illustrative material that is within the students' experience and therefore likely to be comprehensible to them.

3. This experiment makes use of training periods of considerable length which the students have had *prior* to entering the course in psychology. We may fairly assume that these students worked throughout these training periods with characteristic student sincerity.

4. It points forcibly to the fact that *the application of knowledge is one type of transfer.*

5. It reveals clearly that *the existence of identical elements is of itself no guarantee that transfer will take place.*

6. It *should* enable the student to understand why discrete teachers are more likely to employ the potential

than the indicative mode when discussing the transfer of training. Transfer *may* (*and it may not!*) occur.

TABLE I

Percentages of college students who employed algebraic methods in solving each of eight problems.

(See text)

Problem No.	*Percentages of Students*
1	4
2	4
3	3
4	0
5	96
6	96
7	96
8	9

THE CONFIGURATIONAL PSYCHOLOGY OF LEARNING[1]

As Represented by R. H. Wheeler and F. T. Perkins,
Principles of Mental Development, N.Y.
Crowell, 1932, Pp. xxvi + 529.

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I. The Book as Text

The development of American educational psychology has occurred within the framework of an associationism which has pervaded implicitly, if not openly, its remotest categories. Dominant within this framework has been the animating genius of Thorndike, and more work by far has been done under the aegis of the bonds than under any other. There have been voices of dissent but not until recently have they offered a systematic and general substitute for the interpretations which they decried. Most vigorous in criticism and most assiduous in creating an opposing system have been the proponents of *Gestalt-psychologie*. They have militantly proclaimed that associationism is sterile, that the bonds are pernicious, and that the whole, which broods encompassingly over its parts, is the rock upon which all psychology must be built. The new doctrine first applied to educational psychology by Koffka and by Ogden has now in a volume dedicated to these men been given a fresh and, save for general viewpoint, a different formulation.

In the *Principles of Mental Development* Wheeler and Perkins offer a textbook in educational psychology organized about the principles of Wheelerian configurationism and sharply sundered from associationism. It purports to be based on new discoveries which, coordinate with similar ones in biology, neurology, and physics, are destined to revolutionize psychology. "Psychology

[1] This discussion embodies the chief points made by the writer in his part of the symposium making up a part of the program of the Mid-Western Psychological Association, May 13-14, 1932, held at Indiana University, Bloomington, Indiana.

has yet to realize that it is the Science of Human Nature, not the science of sensations, reflexes, mechanical conditioning processes and bundles of urges. It has yet, in general, to make the discovery that man is NOT a machine, that the laws of his behavior are the laws of intelligence, will and personality, not the laws of association" (p. ix). The aim of the book is to organize the data of the subject within the framework of the new conceptions and "to present a Psychology for Education which relates the facts of experiment to the demand of the growing mind to live not only efficiently but with artistic and moral expression" (p. ix).

There is little doubt that from the opening chapter on point of view to the final and twenty-sixth on new procedures in education the book is unique among educational psychologies. The laws of human nature enunciated in the second chapter are followed first by surveys of the embryonic and adult nervous systems, in the development and function of which these laws are exemplified, and then by the chapters on learning, perception and thinking, intelligence, emotion and will, personality, motivation, special educational problems, and the learning of special subjects, topics which comprise the major portion of the book and which likewise follow the configural laws. The concept which, aside from those peculiar to the system, receives the most thorough treatment is the concept of learning and it is with this that the present review will be primarily concerned. Most fruitful and pervasive of the functional concepts of psychology, learning is still more the central and overshadowing problem of educational psychology. The interpretations of it which Wheeler and Perkins offer are a clear departure from the conventional ones, they are even said to be revolutionary and they deserve serious examination.

Something more should be said first, however, about the general character of the book. It is as a presentation of its particular point of view excellently done. What the system implies for learning and for education in general is straightforwardly asserted in clear and vigorous fashion. There are, moreover, a large number of special aspects which do not stand or fall with the system itself, which are of importance and of which a representative few may be cited. (1) The experimental facts appealed to are primarily those of recent years. They testify to a versatile acquaintance with contemporary research both within and without the camp of the gestaltists, an acquaintance which saves the reader from the recital of the old, familiar, and limited data which have long been the common coin of educational psychology. (2) The emphasis on the interrelationship and interdependence of mental functions is salutary and important. It avoids the

facultative hypostatization of function which can still be found in current writing and substitutes a vigorous relativism. (3) Cognizance is taken of the fact that the developing human being is not a passive plaything of its stimulating environment but is instead an active and seeking individual.[1] "It is," therefore, "more important that the prospective teacher know about motivation than about the laws of color mixture and the shape of Pacinian corpuscles." (p. xi.) (4) Under many topics special theories are propounded which offer important possibilities for research. Noteworthy also are the discussions of the synaesthetic character of perception (Chap. VIII), the interpretations of "G" and "S" (pp. 193-195) as well as the whole treatment of intelligence, the handling of will and emotion (Chap. XI), theory of motivation (pp. 269-275, and Chap. XXII), and the discussion of personality (Chap. XII). Throughout the emphasis is on development, not upon static cross-sections. (6) Repeatedly but more particularly in the later chapters significant educational advice is offered on the basis of the facts as interpreted. Much is made, for example, of training so that achievement is its own reward and ulterior motivation is unnecessary. The applications made are of the kind which students expect from educational psychology and do not always receive.

In spite of the important educational implications of its data the first concern of the book is with the defense of a system of psychology. Its strongest and most vigorous chapters are on theory. The problems of discipline and of the special subjects are handled with less sure a touch, with more of homily and with less reliance on experiment. Sometimes the inferences from fact to practice are far flung and require a prophet's faith. The path from the goldfishes' transposition to arithmetical reasoning or from Coghill's embryos to teaching reading may be as straight as Wheeler and Perkins think it is or it may be very crooked. The major applications do not, however, rest upon such inferences. Students of educational psychology may wonder what specific part the nervous systems of embryos, or even those of adults, to say nothing of the evolution of learning from amoeba to chimpanzee, have to play in that particular subject. The system uses them although for the educational psychology they are background only.

The tone of the book is one of militant certainty. The laws of human nature and the interpretations based upon them are

[1] Whether this activity of the organism is consistently carried out is open to question. The part played by the stimulus situation in relation to maturation comes very close to a reduction of the individual to the status of a passive organism.

asserted, not as hypotheses but rather as settled and well determined fact. The opposing mechanistic and associationistic conceptions are false, flatly and without qualification. The new doctrines are to save psychology from the aridity with which the old ones had infused it. To this end the old and the new are not weighed in the balances of fact and logic, the new is hailed at the outset as the wholly true, unmingled with the old. It is implied that this weighing has been done off stage but all the reader hears is the thunder of the vindicated new, the crying of the prophets of a brighter dawn. There is evidence in abundance but it is all offered in support of configurationism and no hint is given that another interpretation is possible. It may be merely personal bias but to the reviewer such apostolic fervor has scant place in the calm, dispassionate procedures by which critical scholarship aspires to assess truth. It can be replied, of course, that a radically different point of view requires vigorous and unquestioning defense in order to insure it a fair hearing; but I doubt if in the perspective of history such methods may be expected to advance knowledge as surely as will calm, habitually skeptical criticality, which never forgets that its most cherished generalization is fettered by its probable error. Students may well be warned that the book's interpretations are not as sure as the confident words of the authors would imply.

Students will find the book interesting, informing, and important. It is not only a usable text for the viewpoint it presents; it is, also, a contribution to the subject. The reviewer finds in it much to criticize but he respects much of it heartily.

II. The Configurational System and Its Application to Learning

The Laws of Human Nature. We may now turn to the fundamental theory upon which the book rests and in terms of which learning is envisaged. Man is a system of energy and his behavior follows the laws of energy. These laws prohibit machine interpretations "and make unnecessary any ultimate, scientific distinction between the mental and the physical" (p. 16). "The mechanistic conception of nature is based upon the false assumption that the complex is to be explained in terms of the simple" (p. 16).[2] One object can act upon another only "through the medium of *a pre-existing relationship between them*" (Authors'

[2] Cf. C. D. Broad's discussion of the varieties of mechanism in *The Mind and Its Place in Nature*, N.Y., Harcourt, Brace, 1929, esp. Chap. II. The particular definition of mechanism given by Wheeler and Perkins is far from being general and its exclusiveness is open to question.

Ital., p. 17). An independent element or part is, therefore, a fiction and the laws of human nature must be the energy-laws of wholes. The major organismic laws are: (1) *field-properties*—"a whole is more than the sum of its parts" (p. 18); (2) *derived properties*—"parts derive their properties from wholes" (p. 19); (3) *determined action*—"the whole determines the activities of its parts" (p. 21); (4) *individuation*—"parts of wholes come into existence through an emergence process called individuation" (p. 22); (5) *field genesis*—"wholes evolve as wholes" (p. 24); (6) *least action*—"units of energy multiplied by units of time are, for a given set of conditions, a minimum" (p. 26); (7) *maximum work*—"any influence affecting a system of energy affects it throughout" and "a maximum amount of energy, for any given set of conditions, will be expended in the course of maintaining balance" (p. 31); (8) *configuration*—"a system of energy always functions as a unit, and always adjusts itself to a multitude of disturbing influences," the latter being called a "total situation" (p. 33).[3]

The eight laws are basic to the interpretation of learning and require examination. They merit more detailed analysis than space allows but their general characteristics may be considered. Insofar as they are laws of energy distribution they can be applied to mental events only by analogy. Analogical inference can be employed validly only when the situation inferred *to* has certain specific, known and essential identities with or similarities to the situation inferred *from*.[4] These specific similarities between energy systems such as a gravitational system, for example, and the learning of a maze or the development of a personality trait are, so far as I can see, lacking and to the extent that they are lacking, the significance of the laws approaches zero. Their application then becomes metaphorical. This recourse to metaphor frequently appears overtly, as in the statement that "human nature is a field property of *societies*" (p. 19); that individuality "is figured, so to speak, upon a ground of human nature" (p. 23); or that "resolution of tension in the group may take the form of worship and propitiation" (p. 31). These statements which are typical of many are understandable only in terms of a similarity suggested by the words used. They are not factual statements made on the basis of precisely analyzed similarities between energy systems and psychological events.

[3] Authors' italics have been omitted in quoting the laws.

[4] No particular mind-body relation is implied in this statement, but only two conceptual systems with no asserted epistemological distinction.

The law of least action, of which much is made, is peculiarly metaphorical. It states that movement takes place from a region of high potential to one of low over the shortest route in time. In the human being potentials are to be thought of as tensions in nerve and muscle. Behavior is a resolution of these tensions or, "in everyday language it is a matter of fulfilling purposes and gratifying desires" (p. 30). The desires and purposes are in consciousness, about which very little is said in the book, but they are represented in the nervous system by physiological stresses. When stresses exist there will be action from high to low potential until the differential is resolved. In the environment are goals perceived by the organism. The goals establish stress differentials and learning is a result of their resolution toward the goal. The organism inevitably "takes the shortest route to the goal which it is able to perceive under the existing conditions" (p. 114), and the organization of the movements will take care of itself.

There are several things to be noted critically about the law of least action. (1) It assumes a general uniformity of relation between consciousness and organic stresses, or between behavior patterns and organic stresses,[5] for which no systematic preparation has been made and for which no direct evidence is offered. It may be said with some certainty that the form and character of this relation is at present almost wholly unknown and that the character of the energy potentials in the nervous system is almost equally undiscovered. The nervous system may act according to the laws as stated. There is much better evidence that it does than that mental events act uniformly in the same way. Laws which state the operation of neural events in terms which are even there liberally based on inference, and which then profess to account for psychological phenomena in the absence of any precisely known relation between the two, can scarcely be taken seriously. They do little more than to state that psychological events act *as if* they followed the laws which it seems that the nervous system follows. The result is a mingling of analogy and metaphor which can hardly serve as the basis of a system of scientific knowledge. (2) The laws imply quantitative measurement and mathematical statement. As used in this book they take the form of qualitative laws in the sense that the mathe-

[5] The treatment is equivocal with regard to consciousness and, for that matter, with respect to the whole range of psychological events. They are not kept distinct from the hypothetical laws according to which they are alleged to proceed.

matics of dynamics is missing and the phenomena and their direction can only be indicated. The system asserts that learners are energy systems and over that there is little argument, but the consistent use of the concept requires a quantitative statement in the absence of which the energy concept explains little.

(3) Leaving to one side the question of the correlation between physiological stresses and psychological phenomena it may be inquired whether the latter in and of themselves may be shown to follow the laws of dynamics, in particular, the law of least action. In order to answer this question it would be necessary to know the energy equivalents of the phenomena. These are not known for even the simplest cases. To say that a learner acquires a simple series of items or solves a maze problem in the most economical way possible under the circumstances is, in the absence of energy measurements, to say nothing more than the statement after the fact that since he learned at all he must have followed least action. (4) This law in company with the others is offered as an *explanatory* law in the sense that it is already known and that under it new phenomena may be subsumed and thereby rendered an intelligible part of knowledge. If the three points first made are valid, it follows that least action is not such a law. It is at best an hypothesis, the statement of which is at present couched in metaphorical terms. The word "law" seems slightly ambitious. The same considerations apply for the most part to the other "laws."

All of the laws refer back to the asserted "fact that wholes are primary" (p. 18). But in what sense are they primary? Are they primary logically, genetically, or in some other sense? The treatment seems to mean at least that the whole serves as the most effective unit with which to work. But any whole save the *ALL* is part of a larger whole. Why, then, scorn the parts, for they are also wholes with reference to their constituent parts and so on to infinite regress? How define where one unit leaves off and another begins? If wholes are to mean anything new as descriptive units, moreover, they must differ in some specified way from parts and this difference must be identifiable by some criterion or criteria. Otherwise description can never attain any systematic exactness. Yet one finds in the book no definite criteria by means of which wholes are identifiable. There is much description of the properties of wholes in general but these properties apply to any configuration, and general properties do not differentiate within the category or categories to which they apply throughout. There is no quarrel with the law of field properties, that a whole is more than the sum of its parts. Before, however,

this law coupled with the primal character of wholes can be made cornerstones of a system, differentiating criteria are required, else description is lost upon a slippery path of infinite regress in two directions.[6]

The eight laws, some more directly than others, state the different phases of the general proposition that everything in the universe is interrelated and that nothing happens in utter isolation from an environing context of events. This is not new although it admittedly needs emphasis in psychology. I do not see that it can be made, as such, a fundamental explanatory principle. It is heuristic and methodological, but the general proposition must go on to state specifically what parts of the context are effective, in what way and in what amounts. The book is, however, more concerned with exhibiting phenomena which may be made to illustrate the laws than with quantitative analysis.

Critical examination of the laws and of their implications would need to go much farther than this in order to be complete at all. Enough has been said, however, to raise sharply the question whether the eight laws may possibly serve as a satisfactory basis for the interpretation of learning. It is the reviewer's judgment that they cannot, and that they are either, as is the case with field properties, defensible logical propositions, but propositions which possess no specific explanatory power, or analogical laws which do not have sufficient known and essential points in common with their physical analogues to make them more than metaphorical. Certainly they cannot be given at present the quantitative formulation which energy laws would require.

Insight. We shall now turn to the treatment of certain more specific problems. The concept of insight plays a less prominent role in the Wheeler and Perkins system than it does in the systems of some other gestaltists, but it is still important. Insight is "descriptive of an organized response at the level of conscious behavior" (p. 83). Criteria by which insight may be recognized are: (1) "*modifiability* of behavior, resulting in correct responses to new situations the first time" (p. 84); (2) transposability of the general properties of the response; and (3) response to a total pattern of stimuli. Others are offered as the discussion proceeds. The word is said to have two uses. In the first use one takes the animal as the reference point and is assured that the animal has its own insight into every situation which it

[6] The criticism that differentiating criteria are lacking does not, it seems, point to an inherent weakness of the system but only to a currently existing one. Criteria are needed for both theoretical and methodological purposes.

faces, although the response may be an error from the experimenter's point of reference. In the second use the problem is the reference point and it may be said that at a given stage the learner lacks insight into the problem, although he always has insight of some kind and never reacts blindly.

The avowedly descriptive use of the term insight is an improvement over the ambiguities of some prior *gestalt* writing, although one might argue that in actual use "insight" is made to bear explanatory weight. To say, however, that insight is always present is only to say that the learner always perceives and reacts to a situation in some way within the range of his perceptual and reactive possibilities. It seems to add nothing of its own to an interpretation of learning, unless one counts the criteria of insight, and they only mirror the general laws.

Trial and Error. The inadequacy of trial and error descriptions of learning is, of course, a corollary of the system. Such description is said to assume that behavior is at first random and that learning occurs by the elimination of wrong responses and the selection of right ones. At the same time the experimenter assumes that the learner is continuously reacting to the goal set up for him by the experimenter's problem, although random activity means action without direction or goal. This criticism is valid against purely chance assumptions but it may be questioned whether the more reflective experimenters have thought of trial and error as a chance matter from any but the standpoint of predicting when the problem will be solved. Any use of the trial and error kind of description involves, however, principles of selection, elimination, and fixation and we may turn to the attack upon repetition and effect as agents in this process and upon the "experience theory" in general.

The repetition of response is said to be powerless, as such, to produce learning. This is demonstrated both by the experimental evidence and by the proposition that the whole cannot be accounted for in terms of its parts. Repetition of stimulation is, however, important because "repeatedly confronting a situation provides the stimulation that is necessary for maturation" (p. 351). The learner, moreover, never faces exactly the same situation twice because in the meantime he has changed and matured. There is repetition only in the sense that there is repeated goal-activity. This view has force against theories which hold repetition to be effective; but it also applies to the Wheeler and Perkins theory of repetition of stimulation. The law of effect is interpreted as one of affect and is discarded. "Feeling and learning belong to the same behavior-pattern having a common cause, the stimulus-situa-

tion and the degree of maturation of the learner" (p. 361). It may be urged, however, that if effect is viewed as of the order of knowledge of results, these criticisms largely lose their force.

The experience theory implies that there is nothing new in learning, that the apparently new is only a recombination of the old. It cannot explain how learning gets started in the first instance and if it cannot account for the first case, how can it explain the 100th? The most obvious thing about a learned response is its newness, a novelty which is more than recombination only. But is it any harder for experience theories to explain the first cases of learning than it is for configurationism? The fact that the parts come together the first time as part of a whole does not explain their connection. It only states a fact. How did they get organized in that particular way to start with and by what principle did association between them then take place? It does not explain to fall back upon derived properties, individuation, or the other laws, for they, at best, only state what has happened, not the necessary determining conditions. The initial stages in the genetic sequence of learning offer a knotty problem which the configurationists have been quick to recognize. It cannot be glossed over, as many other theories have been prone to gloss it, by facile or implicit assumptions, but that the configural theory solves it may be seriously questioned. Concerning the newness of a learned response one may admit that it is logically more than the additive sum of past responses without accepting a gestalt system. In arriving at new responses there is a train of events which look strangely as if some responses made earlier are being dropped out, while others are being continued and new ones elicited. It does not help to say that movements organize themselves as insight extends. The temporal sequence might even be the other way around.

Maturation. The constructive foil which configuration offers to the experience theory is the doctrine of maturation. On the basis of such well known experiments as those of Bird and of Carmichael it is concluded not only that maturation is the fundamental condition of learning in young organisms, but that it is equally important in mature ones. Viewed from the standpoint of the nervous system learning is growth or maturation from undifferentiated to differentiated response. It appears in experience as an evolution of insight. Beginning in tensions relative to remote ends or low potentials it moves toward resolution according to the law of least action. The ideal conditions for this movement would be conditions which are adapted to the subject's stage of maturation and which would lead to mastery at

once. The requirement of more than one trial for the mastery of a task "is a sign that the task is too difficult" (p. 366). The usual learning curves are, therefore, chance curves which express performance under inadequate conditions imposed upon the learner. The only important curve of this sort is a maturation curve which expresses "the learner's normal rate of development as he selects for himself larger and more difficult tasks at each trial" (p. 367).

The concept of maturation as the authors use it seems to the reviewer to be unacceptable. If learning is the realization of a growth potential, does the potential have within itself a specificity of determination whereby the direction of the learning and its immediate content are controlled? If it does the specific character of mental development is an unravelling of what was already present at the beginning. This assumes among other things a pre-established harmony between development and environment which, in addition to being a doubtful concept, makes the discussion of the control of learning an elaboration of the impossible. If on the other hand specificity of content and direction are controlled by stimulation and if the potentials can be resolved upon any material whatever, then to talk of growth potentials as basic is unimportant and is to say only that one was able to learn what one learned. In either case the concept is of small value.

This is not to call in question the evidence upon organic maturation. There is an important difference between the maturation of the mechanisms required by an act and the maturation of the functional organization involved by learning. That chicks peck and tadpoles swim nearly as well after maturation alone as after maturation plus practice does not mean that maturation plays a basic role in the learning of French vocabulary or as an explanation of the efficacy of distributed practice. Learning implies a progressive change through time, but to call this growth is again to resort to metaphor.

The maturation theory, moreover, as it stands at present, void of direct evidence for its existence in adults, yields little possibility for direct control of learning. By manipulation of conditions of which learning is known to be a function, the phenomena of learning can be experimentally controlled to some extent, but it makes no difference whether one uses the maturation theory or not. The results will be the same if one does not. The theory sets a problem for research: the problem whether there is any maturation of functional organization in human beings; but it can scarcely be granted the central position in an explanatory system.[7]

[7] Cf., in this connection, P. A. Witty and H. C. Lehman, The instinct hypothesis *versus* the maturation hypothesis. *Psychol. Rev.*, 1933, 40, 33-59.

A problem to which the system gives little attention, but to which maturation seems to be the systematic key, is that of the way in which and the principles according to which configurations break up, merge, or in other ways undergo progressive change. Resolution of growth potentials does not help. It only asserts that what happens happens. In the absence of a satisfactory account of this, *i. e.*, of satisfactory principles of connection, each whole is in danger of standing out in stark logical isolation and of thereby negating the relativity which is a major feature of the system.

Special Topics. There are many features, more than most books offer, which deserve careful treatment but which must here be mentioned briefly or passed over entirely. Among them are the theory of motivation as related to learning, the interpretations of many of the special problems involved in the determination of learning, the theory of transfer and retroaction and the theory of incidental memory. The problem of the nature of memory receives a more extended and sophisticated treatment than is common in textbooks. The theory finally accepted, however, is one couched in terms of least action. Forgetting is explained in terms of an elimination of stimuli. These and other problems deserve serious consideration from the critical reader.

Gestalt vs. Association. The book is a significant attempt to erect a systematic substitute for an associationistic theory of learning and of all mental events. It is self-confessedly revolutionary and vigorously critical of the point of view it opposes. One may inquire whether, aside from the particular theory presented by Wheeler and Perkins, the contemporary psychology to which this theory is opposed is as atomistically sterile as its critics believe it to be. The definitions and constructive treatments of association by recent writers, notably by Carr and by Robinson,[8] have clearly avoided atomism and the related vices of which the concept of association has been accused. Thorndike's recent emphasis on context effects, belonging and the like is another case in point. Further, the law of contiguity, for example, with its related conditions, does not necessarily mean that order is brought out of an original chaos, nor has it been held that contiguity alone was the associating agent. It has long been known that the subject must *react to* the items as a unit, that there must in Woodworth's phrase be a *noting*, or else contiguity is powerless. This conception plays as dynamic a role as do the *Gestalt* concepts. There is here, moreover, an implicit reasoning from the whole to the parts. Traditional psychology has admittedly lacked

[8] H. A. Carr, The laws of association, *Psychol. Rev.*, 1931, 38, 212-228; and E. S. Robinson, *Association Theory Today.* New York: Century, 1932. These discussions treat association as a methodological concept, but no theoretical atomism is implied.

both a clear enough formulation of this unity and an adequate experimental description of its conditions.

If we turn to the valuable *Gestalt* concepts of relativity and unity we find that they have in another form been present in much recent experimental work. Studies of the influence of the environment on learning and mental work, of the influence of rotating the maze upon learning, of the influence of context, of the law of assimilation, of problem-solving, of intra-serial effects, of guidance, and of many other problems have taken account of the fact that the mental activities examined occurred in a larger context which influenced performance. Description has not been in terms of *Gestalt*, but relativity and unity have been recognized.

This discussion of association has not been for the purpose of showing that there is nothing new in configurationism or that other men have anticipated it. The point is, rather, that in a different way contemporary psychology has been taking account of the unity and relativity of its phenomena, that the rigid one-to-one atomism has slowly been vanishing, if, indeed, it was ever as strongly intrenched as the critics insist. In view of the considerations urged against the eight laws and against the more central interpretations of learning, together with the fact that we are well on the way toward a less atomistic type of systematizing in the general psychological tradition, it seems to me better not to disown our intellectual ancestors but to attempt by the steadier advance of evolution to improve upon them. The theories and experiments of *Gestalt* will aid in defining the present tendency. I question whether their espousal is our sole hope.

There are many possible replies to this, of course, and I shall not attempt to anticipate them all. The most important is the apparent neglect of the fact that the whole is not derivative. But this neglect is not necessary or intrinsic. Everything with which we deal is a whole to the parts thereof and a part to patterns farther up the hierarchy. Even the element of the structuralist was an integration of attributes. The real question seems to be: with what wholes can we deal most effectively at a given stage of science?

The Gestalters, moreover, do not refuse to analyze. If they did, nothing would be left to them save to sit and enjoy, empathically and meditatively, as much of the ALL as their configurations could embrace. They do not choose to analyze as far as is usually done; their elements are larger than those of others. But non-Gestalt psychology has dealt with smaller units and has succeeded in understanding many of the problems of learning. It is experimentally expanding its control to larger contexts.

There is small doubt that greater emphasis must be placed on context effects and on the interaction of contextual patterns. But to call these patterns emergents or Gestalten does nothing more than to name them. Each emergent is a new and larger descriptive unit. I grant readily that it is not derivative from its parts alone. But an emergent or new whole having been found, its relations with others and the conditions of its behavior must be discovered. This may be done it seems to me by the methods already in use.

This is not to return the Gestaltist's fire with the statement that Gestalt is futile. On the descriptive level it has sharpened the focus of systematic thinking upon the unity of any given section of mental life. It has warned that the total relatedness of parts is not reducible without remainder to the additive sum of the constituent parts and it has emphasized the necessity of widening the hierarchy of events which must be controlled when any single condition is varied. These are very significant things. The present book is important for such reasons as these, as well as for many others, and is one to be reckoned with seriously. It throws its particular point of view sharply into focus and its theories set many experimental problems. It is one which anyone acquainted with contemporary theorizing in learning may be expected to know and one which informed critics and systematizers will know thoroughly.

NEWS AND NOTES

The attention of our readers is called to the article in the October, 1932, issue of the Journal of Applied Psychology by Dr. Harriet Babcock, the title being "The Short Army Performance Scale in Clinical Practice." It is the belief of the author and others that Miss Babcock's article will prove very useful to members of the staffs of psychological clinics. Inquiry concerning reprints may be addressed either to the author, 25 Prospect Place, New York City, or to this Journal.

The Association for Childhood Education will hold its annual convention in Denver, June 27 to July 1, 1933. Many educators of national and international prominence are expected to appear on the five-day program among whom will be the following: Julia Wade Abbott, president of the Association and member of the White House Conference on Child Health; Marjorie Hardy, author of text-books on children's reading; Dr. Arnold Gesell, Director of Clinic of Child Development, Yale University, and Rowna Hanson, editor of *Childhood Education*. An elaborate pageant is to be staged in the Park of the Red Rocks on June 30.

The Midwestern Psychological Association will hold its eighth annual meeting as guests of the Department of Psychology, Iowa State College, Ames, Iowa, May 19 and 20, 1933, under the presidency of Dr. H. B. English. Those desiring to submit papers are requested to communicate as soon as possible with the Secretary, Dr. John A. McGeoch, Department of Psychology, University of Missouri, Columbia, Mo.

The Bureau of Publications, Teachers College, Columbia University, has recently published a new group intelligence test, the author of which is Rudolf Pintner, for Grades IV to VIII. The test consists of eight parts: Vocabulary, Logical Selection, Arithmetic Reasoning, Best Answer, Number Sequence, Classification, Opposites and Analogies. The test can be scored about twice as quickly as the usual group test and because of the simplicity of the method the usual scoring errors are reduced 50 to 75 per cent.

Announcement has been made that another Psychological Residential Study Tour will be conducted the coming summer by Dr. Henry Beaumont, University of Kentucky, in cooperation with the Psychological Institute of the University of Vienna. The courses will be given by members of the faculty of that institute and credit

will be granted by the University of Kentucky. This summer school is of special interest to students and teachers of psychology who are desirous of obtaining first hand information about the educational and social systems of Vienna. Those interested in this summer course may obtain detailed information from Dr. Beaumont, University of Kentucky, Lexington, Kentucky.

Of special interest to many of our readers will be the following statement made by the Women's International League:

> "Even though the budget of the Federal Government for 1932 had a deficit of many millions, over 50 per cent of the total revenue was appropriated for two departments alone; namely, the army and navy. In view of this statement, the Women's International League has issued a small sticker to be pasted on the income tax returns as a form of protest. This stamp serves as a notification to the Government that the tax-payer is aware of the injustice of such appropriations and would like to see it remedied."

These stamps are legal if applied to the income tax blank without covering any printing. They can be secured free on request from the Women's International League, 1924 Chestnut Street, Philadelphia, Pa.

BOOK REVIEWS

ALLEN, CHARLES R., and TIEMANN, HARRY A., *Managing Minds*, New York, Century, 1932, pp. XIII-286.

The sub-title indicates the purpose of the book as "a practical psychology for vocational teachers." After reading the first four chapters the reviewer was inclined to try his hand at satire but on reading further found that the remainder of the book did rather well the task which it set out to accomplish. The early chapters set out deliberately to discuss psychology in simple language with no technical terms and evidently aim at the lowest common denominator of the vocational teachers. The treatment is "ultra-brass-tacks" and often resorts to the vernacular. For example, in the discussion of the thought process one stage is described as being "in the think-box." Those early chapters are characterized by an over-simplification of the problems and rather dogmatic solutions. Some profound fact will be dismissed by a clever term and no explanation. We note that thinking means "using your head." We are given suggestions which will enable us to "figure out how the other man's mind works." The authors give the impression that they are nearer the truth than most other psychologists with their discussions of "what thinking really is" and "what habit really is." They are not bothered with laboratory results for "in a sense we carry our own laboratories around with us." Then we find quite a few circular expressions, for example, "one way of motivating is to supply a motive" or again "an incentive is whatever makes an individual want to do something."

Beginning with the fifth chapter, however, the writers settle down to a common sense discussion of the work of the vocational teacher in rather straightforward fashion with a lot of valuable suggestions for such a teacher. For example, there is a pretty straightforward discussion of habit and in tabular form we have a number of characteristics of habit followed in each instance by specific application of that characteristic to the task of the vocational teacher. Rather homely but nevertheless pertinent illustrations are included such as, for example, shifting from driving a Model-T Ford to the A model. In the discussion of incentives there is a list of a considerable number that are available for high school pupils and by way of contrast for vocational school pupils. The authors have a rather interesting way of

arraying items of this sort in parallel columns which serves to emphasize the contrast rather effectively. They classify teaching procedures under three types: (1) informing procedure, (2) instructional procedure and (3) conference method. In the first two of these they give a table showing their estimate of the educational value of various items, such as lecturing, textbook, looking up references, demonstrations, experimentation. They also indicate comparative costs of these procedures. They devote a more lengthy discussion to the conference method which is valuable when the group has a lot of information and the leader can serve more or less as chairman. They discuss various devices that may be used in conferences, such as graphic representations and systematic sets of questions. The teacher's job is analyzed in its wider aspects, such as placement, keeping up with the trade itself, securing cooperation of employers, foremen and academic teachers, as well as developing craftsmanship and morale. Toward the end the authors invent some psychological laws, such as the "law of induction" which indicates that persons tend to adopt the point of view of their associates and the "law of respect" which indicates that we respect a person who can do a job as well or better than we can. They have an interesting distinction in the field of personality as to "first-contact personality" and "permanent type." The last chapter recurs again to learning with reference to three kinds, imitation, "pick-up" and learning by intention.

Aside from the first few chapters the reviewer is not disposed to offer any serious adverse criticism. It is possible that individual differences in pupils might be stressed a little more. The utilization of such differences is not mentioned to any extent until very near the end of the work. The exercises at the end of each chapter are rather well chosen and will doubtless prove stimulating to persons interested in the book. Many of them are in the form "what would you do if———?" It is probable that vocational teachers who have not had much psychological contact will find the book quite helpful. The authors have succeeded apparently in adapting it to the level of attainment of such teachers and in embodying material that will link up with everyday experiences in the profession.

HAROLD E. BURTT,
Ohio State University.

NEW BOOKS AND PAMPHLETS RECEIVED

Books and pamphlets for review should be sent to James P. Porter, Editor, JOURNAL OF APPLIED PSYCHOLOGY, Ohio University, Athens, Ohio.

Bulletin Ergologique. (Supplement to *Science du Travail*). Edited by DR. PAUL SOLLIER and JOSE DRABS. 21 Rue des Drapress, Brussels, Belgium.

Citizens Conference on the Crisis in Education. American Council on Education, 744 Jackson Place, Washington, D. C. 16 pp.

Defects of Speech in School Children. H. T. PARKER. Melbourne University Press, 1932. Melbourne, Australia. Four shillings. 96 pp.

Final Report of the Commission on Medical Education. Office of the Director of Study, 630 W. 168th Street, New York City, 1932. 560 pp.

Manual for a Laboratory Introduction to Psychology. LEIGH CARROLL DOUGLASS. Burgess Publishing Company, Minneapolis, Minn. $2.65. 196 pp.

National Survey of the Education of Teachers. Vol. 1. United States Department of the Interior, Office of Education, Washington, D. C. 118 pp.

The Physical Dimensions of Consciousness. EDWIN G. BORING. The Century Company, New York City, 1933. $2.25. 251 pp.

Psychology. SHEPHERD I. FRANZ and KATE GORDON. McGraw-Hill Book Company, New York City, 1933. $2.50. 494 pp.

Psychological Literature. C. M. LOUTTIT. The Principia Press, Bloomington, Indiana, 1932. 273 pp.

Psychology of Pleasantness and Unpleasantness. I. G. BEEBE-CENTER. D. Van Nostrand Company, New York City, 1932. 427 pp.

Psychology Work Book. SHEPHERD I. FRANZ and KATE GORDON. McGraw-Hill Book Company, New York City, 1932. 227 pp.

Technocracy, An Introduction To. HOWARD SCOTT and others. John Day Company, New York City, 1933. 90 cents. 61 pp.

Directory of American Psychological Periodicals

(Continued)

Psychological Abstracts—Eno Hall, Princeton, N. J. American Psychological Association. Subscription $6.00. 700 pages ann. Edited by W. S. Hunter. Monthly. Abstracts of psychological literature. Founded 1927.

Journal of General Psychology—Worcester, Mass.: Clark University Press. Subscription $7. 500-600 pages annually. Edited by Carl Murchison. Quarterly. Experimental, theoretical, clinical, and historical psychology. Founded 1927.

Journal of Social Psychology—Worcester, Mass.: Clark University Press. Subscription $7.00. 500-600 pages annually. Edited by John Dewey and Carl Murchison. Quarterly. Political, racial, and differential psychology. Founded 1929.

Personnel Journal—Baltimore: The Williams & Wilkins Co. Subscription $5.00. 500 pages, approximately. Edited by Walter V. Bingham. Bi-Monthly.

Mental Measurement Monographs—Baltimore: The Williams & Wilkins Company. Subscription $5. 400 pages annually. Edited by Knight Dunlap and Buford Johnson. Published without fixed dates, each number a single research. Founded 1925.

Studies in Psychology and Psychiatry—Baltimore: The Williams & Wilkins Company. Subscription $5.00. 400 pages annually. Edited by Edward A. Pace. Published without fixed dates, each number a single research. Founded 1926.

Journal of Philosophy—New York: 515 West 116th Street. Subscription $4.00. 728 pages per volume. Founded 1904. Bi-weekly. Edited by F. J. E. Woodbridge, Wendell T. Bush, and H. W. Schneider.

Child Development—Baltimore, Md.: Williams & Wilkins Company. Subscription $5.00. 400 pages annually. Edited by Buford Johnson. Quarterly. Founded 1930.

Character and Personality—Durham, N. C.: Duke University Press. Subscription $2.00 per annum. Quarterly. Edited by Robert Saudek (London) and Ernest Seeman (Durham, N. C.). Founded 1932.

Directory of American Psychological Periodicals

American Journal of Psychology—Ithaca, N. Y.: Cornell University. Subscription $6.50. 624 pages annually. Edited by M. F. Washburn, K. M. Dallenbach, M. Bentley, E. G. Boring. Quarterly. General and experimental psychology. Founded 1887.

Journal of Genetic Psychology and The Pedagogical Seminary—Worcester, Mass.: Clark University Press. Subscription $7. 600 pages annually. Edited by Carl Murchison. Quarterly. Child behavior, differential and genetic psychology. Founded 1891.

Psychological Review—Princeton, N. J.: Psychological Review Company. Subscription $5.50. 540 pages annually. Bi-monthly. General Psychology. Edited by Howard C. Warren. Founded 1894.

Psychological Monograph—Princeton, N. J.: Psychological Review Company. Subscription $6.00 per vol. 500 pp. Ed. by Raymond Dodge. Published without fixed dates, each issue one or more researches. Founded 1895.

Psychological Index—Princeton, N. J.: Psychological Review Company. Subscription $4.00. 300-400 pp. Edited by W. S. Hunter. An annual bibliography of psychological literature. Founded 1895.

Psychological Bulletin—Princeton, N. J.: Psychological Review Company. Subscription $6.00. 720 pages annually. Psychological literature. Monthly. Edited by Edward S. Robinson. Founded 1904.

Archives of Psychology—New York: Columbia University. Subscription $6. 500 pp. ann. Ed. by R. S. Woodworth. Published without fixed dates, each number a single experimental study. Founded 1906.

Journal of Abnormal and Social Psychology—Eno Hall, Princeton, N. J. American Psychological Association. Subscription $5. Foreign, $5.25. Editor, Henry T. Moore. Quarterly. 448 pages annually. Abnormal and Social. Founded 1906.

Psychological Clinic—Philadelphia: Psychological Clinic Press. Subscription $3.00. 288 pages. Ed. by Lightner Witmer. Without fixed dates (9 numbers). Orthogenics, psychology, hygiene. Founded 1907.

Psychoanalytic Review—Washington, D. C.: 3617 10th St., N. W. Subscription $6. 500 pages annually. Psychoanalysis. Quarterly. Ed. by W. A. White and S. E. Jelliffe. Founded 1913.

Journal of Experimental Psychology—Princeton, N. J. Psychological Review Company. 500 pages annually. Experimental. Subscription $6.00. Bi-monthly. Edited by S. W. Fernberger. Founded 1916.

Journal of Applied Psychology—Indianapolis: The C. E. Pauley & Co., Inc. Subscription $5.00. 400 pages annually. Bi-monthly. Edited by James P. Porter, Ohio University, Athens, Ohio. Founded 1917.

Journal of Comparative Psychology—Baltimore: The Williams & Wilkins Co. Subscription $5.00 per volume of 450 pages. Three volumes every two years. Edited by Knight Dunlap and Robert M. Yerkes. Founded 1921.

Comparative Psychology Monographs—Baltimore: Johns Hopkins University Press. Subscription $5. 400 pages per volume. Knight Dunlap, Managing Editor. Published without fixed dates, each number a single research.

Genetic Psychology Monographs—Worcester, Mass.: Clark University Press. Subscription $7.00 per volume. Two volumes per year, 600 pages each. Edited by Carl Murchison. Monthly. Each number one complete research. Child behavior, animal behavior and comparative psychology. Founded 1925.

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